Scientific Explanation & Scientific Realism: Day 2

- Administrative:
  - Three hour meetings tonight, and next week (with a break!)
  - I'll present stuff for a couple more weeks – then students
  - We'll schedule presentations in the next couple of weeks
- Brief Review & Finishing-up From Last Time
  - D–N Explanation (the basics & technical/logical problems)
  - Explanation/Prediction Symmetry Thesis
  - Problematic Examples for D–N & Symmetry Thesis
- Inductive-Statistical (I–S) & Deductive Statistical (D–S)
  - Generalizations of D–N to inductive logic & statistical laws
- Statistical-Relevance (S–R)
  - A "relevant" conception of probabilistic explanation

Brief Review of Deductive–Nomological (D–N) Explanation 1

- A D–N Explanation is (roughly) a deductively valid argument of form:

$T_1, \ldots, T_n$.	[Where, (2) T & $C \vDash E$, $C \nvDash E$, and (3) there
$C_1, \ldots, C_n$.	exists a set of basic statements **S** such that T
$\therefore E$.	is consistent with **S**, **S** $\vDash C$, and **S** $\nvDash E$.]

- And, (1) $T_1, \ldots, T_n$ are true general (theoretical) statements (at least one "covering law"), $C_1, \ldots, C_n$ are true singular (empirical) statements ("conditions"), and E is either a (derivative) law or (more commonly) a singular statement. $\langle T, C\rangle$ is the *explanans*, and E the *explanandum*.
- Fx = x is iron, Cx = x conducts heat, Sx = x is snowcapped, a = Mount Everest, b = Eiffel Tower, Ix = x is imperfect, Px = x is a philosopher, Mx = x is male, c = Oppenheim, d = Hempel. (3) avoids (*), but not (**):

(*)
$T.\ (\forall x)(Fx \supset Cx)$
$C.\ (Fb \supset Cb) \supset Sa$
$\therefore E.\ Sa$

(**)
$T.\ (\forall x)(\forall y)[Ix \vee (Py \supset My)]$
$C.\ (Ic \vee {\sim}Pd) \supset Md$
$\therefore E.\ Md$

Brief Review of Deductive–Nomological (D–N) Explanation 2

- All of these "technical" counterexamples to D–N trade on the fact that *material* implication does not require the antecedent to be *relevant* to the consequent. Since $P \supset Q \approx {\sim}P \vee Q$, we have the infamous paradoxes of $\supset$:

Q
$\therefore P \supset Q$

${\sim}P$
$\therefore P \supset Q$

- Other conditionals do not have these properties. For instance, *counterfactual* conditionals $P \,\Box\!\!\rightarrow Q$ require some sort of *nomic dependence* or *relevance* of P to Q. Let's apply this to a simple example involving a "covering law".
- Let Rx = x is in The Room, Ix = x speaks Italian, a = John. Consider these:

$T.\ (\forall x)(Rx \supset Ix)$
$C.\ Ra$
$\therefore E.\ Ia$

$T'.\ (\forall x)(Rx \,\Box\!\!\rightarrow Ix)$
$C.\ Ra$
$\therefore E.\ Ia$

- Dilemma [assume that (C) is true]: (T) is true, but *explanatorily irrelevant* to (E); and, (T') is (more) explanatorily relevant to (E), but *false*. It's easy to make material conditionals *true*, but hard to make them *explanatory*. And, it's hard to make counterfactuals true, but they seem to be more *relevant*.

Hempel's Explanation/Prediction Symmetry Thesis

- Hempel thought that every adequate (singular) explanation is a potential prediction, and *vice versa*. Why did he think this? Does it make sense? There are two distinct directions to this thesis:

($\Rightarrow$) Adequate Explanation $\Rightarrow$ Potential Prediction

($\Leftarrow$) Potential Explanation $\Leftarrow$ Adequate Prediction

- Both directions may sound strange, at first. Some clarification helps:
- Hempel: an adequate explanation should provide grounds for holding that the explanandum was to be expected. So, if E is not known, an explanation should provide grounds that E is to be expected.
- Hempel: ($\Rightarrow$) is "almost trivial." Defense against Scriven's attack:
  - Scriven: Only people who have had syphilis can contract paresis. But, only a small fraction (around 25%) of syphilis patients contract paresis. It seems quite *explanatory* to say that a person got paresis *because* they had syphilis. But, does syphilis *predict* paresis?

- Hempel: "Precisely because paresis is such a rare sequel of syphilis, prior syphilitic infection cannot by itself provide an adequate explanation for it." This presupposes there are other factors that determine which untreated cases of syphilis go on to develop paresis.
- But what about genuine chance events – can they can not be explained at all? *E.g.*, the radioactive decay of a particle (at a time). This may be very improbable, given our best theory. But, do we then conclude that our best theory cannot explain these events?

• As for ($\Leftarrow$), Hempel gives what appears to be a counterexample:

- "A finite set of data obtained in an extensive test of the hypothesis that the electric resistance of metals increases with their temperature may afford good support for that hypothesis and may thus provide an acceptable basis for the prediction that in an as yet unexamined instance, a rise in temperature in a metal conductor will be accompanied by an increase in resistance. But if this event actually occurs, the test data [or the correlation or law one might infer from the data] do not provide an explanation for it."
- What does Hempel say about this "counterexample" to ($\Leftarrow$)?

- Common Causes: we can *adequately predict* a storm using a falling barometer needle, but is this a potential *explanation* of its arrival?
- Hempel: there may be incompletely formulated potential explanations in these cases. He doesn't hint at what they might be.

• So, why does Hempel find the symmetry thesis attractive? Consider:

(‡) $\langle T, C\rangle$ *explains* $E \Leftrightarrow E$ *confirms* $\langle T, C\rangle$ [say E confirms C, given T]

• Hempel's theory of confirmation is also deductive (much like D–N). This is why Hempel feels the need to defend something like (‡).

• It seems that $\Leftarrow$ of (‡) is false, since "explains" seems asymmetric, while "confirms" (*i.e.*, "provides evidence for") is (arguably) symmetric. We'll return to the symmetry question repeatedly this term.

• But, what about $\Rightarrow$ of (‡)? It's not clear that $\Rightarrow$ is false. Take the paresis (Pa) and syphilis (Sa) example. Let T be the law that S is (generally) nomically necessary (but only "25% sufficient") for P. [Interpretation of Pr!]

• Then, $\Pr(Pa \mid Sa \,\&\, T) = 0.25$, which is low. But, $\Pr(Pa \mid {\sim}Sa \,\&\, T) = 0$, which is *much lower*! So, plausibly, *Pa confirms Sa*, given T.

Some Famous Problematic Cases for D–N (& some other theories)

1. **The Eclipse**: One can D–N-explain a current total eclipse, using (say) Newton's laws of motion, together with past positions of the earth, sun, moon. But, one can also D–N-explain a current eclipse by appeal to NL plus *future* positions! Should this count as an *explanation*? Many laws are time-symmetric – perhaps some explanations aren't.
2. **The Flagpole**: We may D–N-explain the length of a shadow cast by a flagpole using certain laws of optics/geometry, together with the position of the sun in the sky, etc. But, we can also D–N-explain the height of the flagpole using the same laws, together with the length of the shadow and the position of the sun! Is this an *explanation*?
3. **The Barometer**: A falling barometer (together with the appropriate meteorological laws) can reliably predict an approaching cold front. So, one may also be able to D–N-explain the approach of the cold front by appealing to the barometer's drop, together with these same meteorological laws. These are *common cause* (*conjunctive fork*) cases.

4. **The Moon and the Tides**: The (general and lawlike) *correlation* between the moon's position and the tides was well known for centuries before Newton's gravitational theory was known. So, reliable predictions, and D–N-explanations of the tides were constructible by these ancestors of Newton. But, arguably, until the *causal story* behind the tides was told, no *legitimate* explanation was really available.
5. **Syphilis and Paresis**: Only people who have had syphilis can contract paresis. But, only a small fraction (around 25%) of syphilis patients contract paresis. It seems quite *explanatory* to say that a person got paresis *because* they had syphilis. But, this cannot be said on a D–N account (which requires *deduction* of each token case). Similar examples arise surrounding quantum-mechanical phenomena.
6. **The Hexed Salt**: Why did this sample of table salt dissolve in this cup of water? Because a person wearing a funny hat mumbled some non-sense syllables and waived a wand over it. That is, the table salt dissolved because it was hexed. And, it is a *law* that all hexed table salt dissolves when placed in water. This fits the D–N pattern . . .

7. **Fred Fox on the Pill**: Fred Fox (a male) has not become pregnant during the past year because he has faithfully consumed his wife's birth control pills. And, any male who faithfully takes birth-control pills will avoid becoming pregnant. But, intuitively, there seems to be no *explanatory relevance* in this fact. This also fits the D–N pattern.

8. **Explanation by false/idealized theories**: We use Newton's theory all the time to explain various phenomena. But, we know Newton's theory is *false*. Moreover, for all we know, all of our current scientific theories are also false (in some subtle and as yet unseen way). Would this imply none of our current scientific explanations are good ones? [Remember this for REALISM!]

9. **Logical Tricks & *Misc.* (some like Kaplan *et al*)**:

All things born die.
John was born.
$\therefore$ John died.

All crows are black.
John isn't black.
$\therefore$ John isn't a crow.

All copper conducts electricity.
Either my alarm didn't go off today, or some copper doesn't conduct electricity.
$\therefore$ My alarm didn't go off today.

Decade #2 — The Birth of Statistical Explanation

- H & O were aware that their D–N account (as originally stated) left no room for the explanation of either (1) statistical laws, or (2) token events which cannot be derived from any theory (but on which some theory + auxiliaries/initial conditions may *confer a probability*).
- Hempel's first alteration (a very minor one) was to expand the explanation of *laws* (by more general laws) in D–N to the case of *statistical laws*. This led to the *Deductive-Statistical* (D–S) model.
- On the D–S model, a statistical law may be explained by appeal to more general laws (which may be statistical or universal).
- **Example**: we may derive the half-life of uranium-238 from the basic laws of quantum mechanics (together with the height of the potential barrier surrounding the nucleus and the kinetic energies of the alpha particles within the nucleus). D–S as a mere *variant* of D–N.
- Same problems as D–N (*plus* statistical laws & qualitative predicates!)

Inductive–Statistical Explanation I

- Hempel offered an inductive generalization of his D–N model of explanation. He called this model the Inductive–Statistical (I–S) model.
- Hempel updated his four high-level desiderata accordingly:
  1. An explanation is an argument having correct logical form (either deductive or inductive — traditional "inductive strength" idea).
  2. The explanans must contain,. essentially, at least one general law (either universal or statistical).
  3. The general law must have empirical content.
  4. The statements in the explanans must be true.
- Hempel quickly realized that a fifth adequacy condition must be added, because of the *non-monotonicity* of "inductively strong" arguments:
  5. (RMS) The requirement of *maximal specificity*.

Inductive–Statistical Explanation II

- The simplest schema for an I–S explanation would be:

$$\begin{array}{ll} \Pr(Gx \mid Fx) = r & \\ Fb & \\ \hline\hline Gb & [r] \end{array}$$

- Here, "$\Pr(Gx \mid Fx) = r$" is a 'statistical law' which says that the relative frequency of Gs among Fs is r. Note: this is a *non-modal* frequency, just as $(\forall x)(Fx \supset Gx)$ is a non-modal (extensional) "universal law".
- "$[r]$" is supposed to be the argument's *inductive strength*. But, is it? Unclear.
- **Example**: John Jones (b) recovers quickly (Gb) from Strep (Fb). Most strep infections (Fx) clear up quickly (Gx) when treated with penicillin (Hx). Thus, we have the following I–S explanation of the fact that Gb:

$$\begin{array}{ll} \Pr(Gx \mid Fx \,\&\, Hx) = r \approx 1 & \\ Fb \,\&\, Gb & \\ \hline\hline Gb & [r \approx 1] \end{array}$$

Inductive–Statistical Explanation III

- But, what if we were to subsequently learn that John Jones was infected with a *penicillin-resistant* strain of Strep (Jb)? Plausibly, this would lead to a "strong" I–S explanation of $\sim Gb$, as follows:

$$\frac{\begin{array}{l}\Pr(\sim Gx \mid Fx \,\&\, Hx \,\&\, Jx) = r_1 \approx 1 \\ Fb \,\&\, Gb \,\&\, Jb\end{array}}{\sim Gb} \quad [r_1 \approx 1]$$

- This is the *reference class problem* for frequency interpretations of probability. Depending on which reference class we decide to include b in, we get different "Pr(Gb)"s. We can have "strong arguments" for both Gb and $\sim Gb$! This is *impossible* with deduction (and D–N) — "Hempel's Ambiguity".
- In confirmation theory (done *epistemically*!) we usually add the requirement of *total evidence*. That is, we usually add the requirement that *no additional evidence that would change "the* Pr(Gb)*" is available at the time*. This will *not* work here, since the *explanandum* (say, Gb) is *known*! What shall we do?

The Reference Class Problem: An Infamous Example

(b)	Nicole Brown Simpson.
(Ax)	x was abused by her spouse.
(Kx)	x was killed by her spouse (or ex-spouse).
($K'x$)	x was killed (by *someone*).
($\Pr(Xx \mid Yx)$)	The *frequency* of X's among the Y's, in the actual world.

(1)	Dershowitz:	$\Pr(Kx \mid Ax) < \frac{1}{1000}$
(2)	Good:	$\Pr(Kx \mid Ax \,\&\, K'x) \approx \frac{1}{2} \gg \frac{1}{1000}$
(3)	Merz & Caulkins:	$\Pr(Kx \mid Ax \,\&\, K'x) \approx \frac{4}{5}$
(4)	Dershowitz:	$\Pr(Kx \mid K'x) \approx \Pr(Kx \mid Ax \,\&\, K'x)$
(5)	Merz & Caulkins:	$\Pr(Kx \mid K'x) \approx 0.29 \ll \Pr(Kx \mid Ax \,\&\, K'x) \approx 0.8$

- Each of these is supposed to be relevant to "Pr(Kb)". But, depending on the reference class in which we decide to include Nicole Brown Simpson, we can get radically different "Pr(Kb)"s. This another example of the reference class problem for frequencies. This is the ultimate source of "Hempel's Ambiguity".

Inductive–Statistical Explanation IV

- Hempel adds the *requirement of maximal specificity* (RMS). Here, we assume that **P** is the conjunction of all of the premises of the I–S explanation, and K is the available background knowledge (salient to the properties of b).

(RMS) If **P** & K implies that b belongs to a class F_1 and that F_1 is a subclass of F, then **P** & K must also imply a statement specifying the statistical probability (*viz.*, the *relative frequency*) of G in F_1, say

$$\Pr(G \mid F_1) = r_1.$$

And, $r_1 = r$, unless the probability statement in question is simply a theorem of probability theory proper (*e.g.*, $\Pr(G \mid F_1 \,\&\, G) = 1$).

- The "unless" clause in (RMS) is there to block the trivialization which would otherwise arise from the fact that we know from K that b is both F and G, since probability theory (proper) implies that $\Pr(Gx \mid Fx \,\&\, Gx) = 1$.
- Note, deductive arguments *automatically* satisfy (RMS). *Why*?

Inductive–Statistical Explanation V

- NOTE: The root problem is not just a problem for frequency interpretations of Pr. The root problem is that "inductively strong argument" is *not monotonic*.
- Hempel: the *non-monotonicity* ("ambiguity") of inductive inferences leads, inevitably, to the *epistemic relativity* of statistical explanation:

  The concept of statistical explanation for particular events is essentially relative to a given knowledge situation as represented by a class K of accepted statements.
- Many philosophers (*e.g.*, Skyrms in *Choice & Chance*) take a similar attitude in the more general setting of inductive *logic*. It seems that inductive strength (confirmation) is *relational*, but why must that make it *epistemic*?
- We don't we take the same attitude toward special relativity. We say that things like "simultaneity" and "velocity" are *relational* (*i.e.*, relative to a *frame of reference*), but we *don't* seem to think they depend on *what we know*.
- Why the different attitude when it comes to inductive inference (*vs* deductive inference)? Coffa and Railton see this with explanation, but not confirmation.

- Coffa's discussion (which Salmon discusses at length) is quite illuminating on this issue of "epistemic relativity". He says, about "confirmation", that:

  > Although the syntactic form of expressions like "hypothesis *h* is well-confirmed" may mislead us into believing that confirmation is a property of sentences, closer inspection reveals the fact that it is a relation between sentences and knowledge situations and that the concept of confirmation cannot be properly defined . . . without reference to sentences intended to describe a knowledge situation.

- But, interestingly, Coffa sings a different tune about "explanation":

  > s the possibility of a notion of true explanation . . . is not just a desirable but ultimately dispensable feature of a model of explanation: it is the *sine qua non* of its realistic, non-psychologistic inspiration. It is because certain features of the world can be deterministically responsible for others that we can describe a concept of true deductive explanation . . . If there are features of the world which can be non-deterministically responsible for others, then we should be able to define a model of true inductive explanation.

- He criticizes Hempel for "going epistemic" with explanation. I agree, but,
- Why not say the same thing about inductive *arguments/logic*? Isn't the notion of a "good argument" the *sine qua non* of the realistic, non-psychologistic inspiration of *logic* (inductive or not)? Why go epistemic with *confirmation*?

Inductive–Statistical Explanation VI

- Perhaps you can guess what some of the problems with I–S explanation are going to be. On the traditional account of the "inductive strength" of $P \therefore C$ [$\Pr(C \mid P)$] probabilistic *relevance* is not required.
- "$\Pr(X \mid Y)$ is high" is neither necessary nor sufficient for "Y is relevant to X". The Fred Fox example, and the paresis/syphilis example (above) show that *relevance* is an important aspect of explanations.
- Both the D–N and the I–S accounts suffer from the relevance problem. The hexed salt example shows that D–N is also vulnerable here.
- While high probability is neither necessary nor sufficient for high explanatory power, it may still be plausible that *ceteris paribus* (*e.g.*, *assuming* relevance) high*er* probabilities lead to *better* explanations.
- Even this can be seriously questioned. Michael Strevens has a nice discussion in his recent paper "Do Large Probabilities Explain Better?" [on website]. Richard Jeffrey, and others have questioned this, but Strevens defends it.

Inductive–Statistical Explanation VII

- Jeffrey's Example (really, a variant explained by Woodward):

  Consider a genuinely indeterministic coin which is biased strongly (p = 0.9) toward heads when tossed. Suppose that if it is not tossed the coin has probability of 0.5 of being in either the heads or tails position and that whether or not the coin is tossed is the only factor that is statistically relevant to whether it is heads or tails. According to the IS model, if the coin is tossed and comes up heads, we can explain this outcome by appealing to the fact that the coin was tossed (since under this condition the probability of heads is high) but if the coin is tossed and comes up tails we cannot explain this outcome, since its probability is low . . . The fact that the coin has been tossed is the only factor relevant to either outcome and that factor is common to both outcomes once we have cited the toss . . . we left nothing out that influences the outcome.

- As Woodward explains, such arguments presuppose that "it is not possible for all of the information that is relevant to some M to be insufficient to explain it. . . . It is far from self-evident that this assumption is correct."

Statistical–Relevance Explanation I

- Salmon, Greeno, Jeffrey, and others were among the first to question the high probability requirement of the I–S account.
- As we have just seen, Jeffrey argued that stochastic processes generate outcomes with varying probabilities, and that we understand the low probability outcomes as well as we understand the high probability outcomes.
- Salmon and Greeno formulated theories in which the key probabilistic fact is a fact about probabilistic *relevance* — not just the (high, posterior) probability of the explanandum, given the explanans.
- Accounts involving relevance as the key attribute face special problems of their own — problems not faced by the I–S account.
- The most important of these is known as *Simpson's Paradox*. Nancy Cartwright describes a good example illustrating this paradox.

Statistical–Relevance Explanation II

- In the early 80's there was a positive correlation between being female (F) and being rejected from Berkeley's graduate school (R).
- This (initially) raised some suspicions about the possibility of sexual discrimination in the admissions process for Berkeley's grad school.
- Symbolically, $\Pr(R \mid F) > \Pr(R)$. That is, being female is *statistically relevant* to being rejected from Berkeley grad school. Or is it?
- If we *partition* the applicants according to the department to which they applied: $\{D_1, \ldots, D_n\}$, then the correlation disappears!
- That is, $\Pr(R \mid F \,\&\, D_i) = \Pr(R \mid D_i)$, for all i.
- Should we still be suspicious about sexual discrimination? Or, more relevantly here, should we still think that the gender of the applicant is *explanatorily relevant* to why they got rejected (or accepted)?

Statistical–Relevance Explanation III

- Simpson's Paradox forces the statistical relevance theorist to make some special maneuvers. Enter the notion of "homogeneous relevant partition".
- Salmon's original S–R account is intended to provide an answer to the question "Why does this (member of the reference class) A have the attribute B?" If the question is not stated this precisely, then Salmon suggests using "pragmatics" to determine the reference class (ghosts of Hempel's ambiguity).
- An S–R explanation (of why this A is a B), consists of the prior probability of B (given A), a homogeneous relevant partition $\{A \,\&\, C_i\}$ of A with respect to B, the posterior probabilities of B in each cell $A \,\&\, C_i$ of the partition, and a statement of the location of the individual in a particular cell $A \,\&\, C_k$:
  - $\Pr(B \mid A) = p$
  - $\Pr(B \mid A \,\&\, C_i) = p_i$
  - $\{A \,\&\, C_i\}$ is a homogenous relevant partition of A with respect to B
  - b is a member of $A \,\&\, C_k$

Statistical–Relevance Explanation IV

- To fix ideas, let's return to the Berkeley graduate school example. Let b be some applicant (A) who was rejected (B). And, we want to know why this applicant (b) was rejected (*i.e.*, why this A (b) is a B).
- A *partition* $\{A \,\&\, C_i\}$ of a class A is a collection of mutually exclusive and exhaustive subsets of A. Each subclass $A \,\&\, C_i$ in the partition $\{A \,\&\, C_i\}$ is called a *cell* of the partition.
- A partition $\{A \,\&\, C_i\}$ of A is *relevant* with respect to B if the probability (*i.e.*, the relative statistical frequency!) of B in each cell $A \,\&\, C_i$ of the partition is different from each other cell, *i.e.*, $\Pr(B \mid A \,\&\, C_i) \neq \Pr(B \mid A \,\&\, C_j)$, all $i \neq j$.
- A partition F is *homogeneous* with respect to B if *no relevant partition (wrt B) can be made within* F. *Objectively* homogeneous = no relevant partition can be made *in principle*; *epistemically* homogeneous = no relevant partition is *known* (presumably, by the explain*er*). Here, the interpretation of Pr is crucial!
- In the case at hand, we do know a relevant partition of A with respect to B:

- That partition is $\{A \,\&\, C_i\}$: the partition in which the C_i are the *genders* of the applicants. If C_1 = Male, and C_2 = Female, then:

  $$\Pr(B \mid A) = p,\ \Pr(B \mid A \,\&\, C_1) = p_1,\ \Pr(B \mid A \,\&\, C_2) = p_2$$

  Here, $p_2 < p < p_1$. Therefore, the partition $\{A \,\&\, C_i\}$ is *relevant* to B.
- Intuitively, the partition $\{A \,\&\, C_i\}$ is *not* "explanatory" with respect to B. This is because there is a further set of (intuitively) *relevant factors* $\{D_i\}$ such that:

  $$\Pr(B \mid A \,\&\, C_1 \,\&\, D_i) = \Pr(B \mid A \,\&\, C_2 \,\&\, D_i), \text{ for all } i$$

- Does this mean that the original partition $\{A \,\&\, C_i\}$ is *not homogeneous* with respect to B? If so, that would undermine an explanation of Ab which appeals to the $\{A \,\&\, C_i\}$ partition (*i.e.*, an explanation in terms of *gender*). Intuitively, that's the answer we want, and that's what "homogenaeity" is supposed to do.
- We can't tell from the information so far whether the finer-grained partition $A \,\&\, C \,\&\, D$ is relevant. For that, we'd need to check and see whether, *e.g.*, $\Pr(B \mid A \,\&\, C_2 \,\&\, D_i) \neq \Pr(B \mid A \,\&\, C_2 \,\&\, D_j)$, for $i \neq j$. As it turns out (in the example at hand), the answer is YES. Is this a vindication of the S–R model?

Statistical–Relevance Explanation V

- Intuitively, "homogeneity" is *intended* to block the explanatoriness of gender for acceptance in the Berkeley grad school example. And, Salmon's definition of "homogeneity" does seem to to the trick in this case. But, will it always?
- If Pr is just a *statistical frequency*, then there may be further "relevant" partitions of the data in Salmon's sense. Or, there may happen to be no further "relevant" partitions. Is *statistical* relevance *explanatory* relevance?
- Interesting fact about the Berkeley Case: If one partitions *further within* C & D, according to Z = the first letter of the applicant's last name is between "F" and "K", then *this* is a further *statistically relevant* partition á lá Salmon.
- I don't think we'd want to say that C & D & Z is an *explanatorily* relevant partition, nor would we want to say that the existence of this finer-grained partition *rules*-*out* the explanatory relevance of the coarser-grained C & D.
- Statistical relevance can be *misleading* about explanatory relevance. What we want is "homogeneous" in the sense of "including all the *explanatorily* relevant factors". Idea: *causal* relevance? This is where Salmon goes next . . .