- Here is a (naïve) "*reductio*" of classical deductive logic:
  (1) For all sets of statements X and all statements p, if X is inconsistent, then p is a logical consequence of X.
  (2) If an agent S's belief set B entails p (and S *knows* $B \vDash p$), then it would be reasonable for S to infer/believe p.
  (3) *Even if* S knows their belief set B is inconsistent (and, hence, that $B \vDash p$, for *any* p), there are still *some* p's such that it would *not* be reasonable for S to infer/believe p.
  (4) $\therefore$ Since (1)–(3) lead to absurdity, our initial assumption (1) must have been false — *reductio* of the "explosion" rule (1).
- Harman [8] would concede that (1)–(3) are inconsistent, and (as a result) that *something* is wrong with premises (1)–(3).
- But, he would reject the relevantists' diagnosis that (1) must be rejected. I take it he'd say it's (2) that is to blame here.

☞ (2) is a *bridge principle* [10] linking *entailment* and *inference*.

- (2) is correct *only* for *consistent* B's — *even if* B is consistent, the correct response *may* be to *reject* some $B_i \in B$. [Indeed, I bet *any plausible* BP will be *too weak* to undergird this *reductio*.]

- Carnap [1] distinguishes two kinds of *inductive*-logical (*viz.*, *confirmation*) relations, each explicated probabilistically:
  - E confirms$_f$ H relative to K iff $\Pr_\top(H \mid E \,\&\, K) \geq t > 1/2$.
  - E confirms$_i$ H relative to K iff $\Pr_\top(H \mid E \,\&\, K) > \Pr_\top(H \mid K)$.
    - For Carnap, it was important that $\Pr_\top(\cdot \mid \cdot)$ was *itself* "logical" (*i.e.*, some sort of "partial entailment" relation).
- Carnap thought that there were *bridge principles* connecting these *logical* concepts with (suitable) *epistemic* concepts.
- In the first edition of LFP, Carnap only discusses BPs for confirmation$_f$. Unfortunately, the second edition does not contain a *re-examination* of those BPs for confirmation$_i$.

☞ *This* is where the seeds of the OEP were sown.

- Carnap's central BP for confirmation$_f$ is (in modern parlance)

(RTE$_f$) *If* (1) S's total evidence (in context C) is K, *and* (2) S knows (in C) that E confirms$_f$ H relative to K, *then* S's *conditional degree of belief* in H, given E (in C) should be $> 1/2$.

- There are various problems with (RTE$_f$), but Old Evidence [6] is *not* one of them. Next, I'll propose a candidate (RTE$_i$), and explain why OEP refutes it. Then, I'll return to (RTE$_f$).

- Because Carnap never explicitly discussed BPs for confirmation$_i$, we are left to speculate about (RTE$_i$).
- I think the most natural candidate for (RTE$_i$) is the following BP which connects confirmation$_i$ and the epistemic relation of *evidential support* (in a context C).

(RTE$_i^0$) E evidentially supports H *for* S *in* C iff E confirms$_i$ H relative to K, where K is S's *total evidence in* C.

  - Carnap never explicitly defends (RTE$_i^0$), and I think there is good reason to believe that he would not have (more below).
- I think (RTE$_i^0$) has been (usually only implicitly) presupposed by various Bayesian epistemologists over the years.
- But, the Old Evidence Problem provides a counterexample to (RTE$_i^0$). As Tim Willimson points out in [11, ch. 9]:
  (†) (RTE$_i^0$) entails that *nothing* S *already knows (i.e., no* E *such that* $K \vDash E$*) can evidentially support anything (for* S*).*
- In light of (†), nobody should accept (RTE$_i^0$). But, is *this* a problem for inductive *logic*? [Think: analogy w/Deduction.]

- Let's return to (RTE$_f$) for a moment. I claimed that the OEP poses a problem for (RTE$_i$), but not (RTE$_f$). Here's why:
  - If $K \vDash E$, then E does *not* confirm$_i$ (any) H, relative to K, since $\Pr(E \mid K) = 1$ entails $H \perp\!\!\!\perp E \mid K$, for *any* H and *any* Pr.
  - But, $K \vDash E$ is perfectly compatible with the claim that E confirms$_f$ H relative to K, since $\Pr(E \mid K) = 1$ does *not* entail that $\Pr(H \mid E \,\&\, K) < t$ (for *any* fixed threshold t).
- This is why Carnap never discussed the OEP. I bet that if he had re-worked his BP for confirmation$_i$, he would have.
- And, I suspect that Carnap might have offered something similar to Tim Williamson's [11, ch. 9] alternative to (RTE$_i^0$).
- In his discussion of Hempel's $\mathfrak{c}$-theory [1, *p*. 472], Carnap introduces a relation called "initial" confirmation$_i$, which naturally suggests the following Williamson-like BP:

(RTE$_i^\top$) E evidentially supports H for S in C iff S possesses E as evidence in C and $\Pr_\top(H \mid E \,\&\, K_\top) > \Pr_\top(H \mid K_\top)$.

  - Here, $K_\top$ is "empty/*a priori*", and $\Pr_\top(\cdot \mid \cdot)$ is "logical". [Williamson's Pr/K are different, but also "impoverished".]

- I mentioned that (RTE_f) had *other* problems. Mainly, these other problems have to do with the *existence of* (and/or our *access to*) "logical" (or even *"a priori"*) *probabilities* $\Pr_\top(\cdot \mid \cdot)$.
- *That* problem also plagues the Carnap/Williamson ($RTE_i^\top$) principle (as does the intelligibility and probative value of "empty" background corpora $K_\top$ — whatever *those* are).
- These reasons (and others) lead me to reject the Carnap/Williamson ($RTE_i^\top$)-line on old-evidence.
- I won't have time to discuss this today, but my alternative approach to inductive-*logic* [4, 5] involves making probability models $\mathcal{M}$ *parameters* of $\mathfrak{c}_i$-functions.
- So, on my view, the choice of model $\mathcal{M}$ (for *applications* of IL) *not* a *logical* choice, but an *epistemic/empirical* choice.
- Thus, I think the (*epistemic*!) moral of the OEP is as follows:
  - (‡) Probability models $\mathcal{M}$ on which E (or H for that matter!) has an extreme probability are (typically) inappropriate for assessing E's evidential relevance (regarding H).

☞ (‡) is no problem for inductive-*logic* (properly construed).

- Most subjective Bayesians (*not Jim* [9]!) accept (‡). So, they need an *alternative* to S's *own subjective probability model* $\mathcal{M}_S$, which *does* assign extreme probability to E in OEP C's.
- There is a vast literature on this [2]. Most of it involves various forms of "surgery" on $\mathcal{M}_S$, to yield a "nearby" model $\mathcal{M}'_S$ for the purpose of *evidential relevance assessments*.
- I find this literature very unsatisfying. I also think it underestimates the scope of the underlying problem.
- I have recently argued [3] that Goodman's "grue" argument against Carnapian inductive logic trades on the naïve BP (RTE_i^0) connecting confirmation$_i$ and evidential support.
- What my reconstruction of Goodman's argument (included on the next slide) reveals is that the OEP and the "grue" problem both provide (similar) reasons to reject (RTE_i^0).
- I think this suggests that the kinds of "surgery" subjective Bayesians need to practice may be more subtle than OEP implies. ☞ I suspect an *inoperable* underlying problem.

- Let $Gx \overset{\text{def}}{=} x$ is green, $Ox \overset{\text{def}}{=} x$ is examined prior to t, and $Ex \overset{\text{def}}{=} x$ is an emerald. Then, $\mathcal{G}x \overset{\text{def}}{=} x$ is grue $\overset{\text{def}}{=} Ox \equiv Gx$. And:
  - (H_1) All emeralds are green. $[(\forall x)(Ex \supset Gx)]$
  - (H_2) All emeralds are grue. $[(\forall x)[Ex \supset (Ox \equiv Gx)]]$
  - ($\mathcal{E}$) $Ea \,\&\, Oa \,\&\, Ga$
- Here is Goodman's [7, *ch*. 3] "*reductio*" of "Carnapian" IL — in fact, it's a "*reductio*" of *any* Pr-explication of confirms$_i$!
  - (i) E confirms$_i$ H, relative to K iff $\Pr(H \mid E \,\&\, K) > \Pr(H \mid K)$.
  - (ii) E evidentially supports H *for* S *in* C iff E confirms$_i$ H, relative to K, where K is S's *total evidence in* C. [(RTE_i^0)]
  - (iii) The agent S who is assessing the evidential support $\mathcal{E}$ provides for H_1 *vs* H_2 in a Goodmanian "grue" context $C_{\mathcal{G}}$ has Oa as part of their total evidence in $C_{\mathcal{G}}$ [*i.e.*, $K \vDash Oa$].
  - (iv) *If* $K \vDash Oa$, *then—c.p.—*$\mathcal{E}$ confirms$_i$ H_1 relative to K iff $\mathcal{E}$ confirms$_i$ H_2 relative to K, for ***any*** $\Pr(\cdot \mid \cdot)$.
  - (v) Therefore, $\mathcal{E}$ evidentially supports H_1 for S in $C_{\mathcal{G}}$ if and only if $\mathcal{E}$ evidentially supports H_2 for S in $C_{\mathcal{G}}$.
  - (vi) But, intuitively, $\mathcal{E}$ evidentially supports H_1 for S in $C_{\mathcal{G}}$, and $\mathcal{E}$ does *not* evidentially support H_2 for S in $C_{\mathcal{G}}$.

    Contradiction. *Reductio* of (i)? No. Another counterexample to (ii).

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[4] ______, *Inductive Logic*, in *Philosophy of Science: An Encyclopedia*, J. Pfeifer & S. Sarkar *eds.*, Routledge, 2005.

[5] ______, *Logical Foundations of Evidential Support*, *Phil. of Science*, 2007.

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[9] J. Joyce, *The Foundations of Causal Decision Theory*, Cambridge University Press, 1999.

[10] J. MacFarlane, *In what sense (if any) is logic normative for thought?*, unpublished manuscript, 2004.

[11] T. Williamson, *Knowledge and its Limits*, Oxford University Press, 2000.