# Philosophy 148 — Announcements & Such

- I hope you all enjoyed Mike & Kenny's lectures last week!
- HW #3 grades are posted. People did very well ($\mu = 93, \sigma = 8$).
- I've posted solutions (and common mistakes) for HW #2.
- HW #4 is due Thursday. I'll discuss its content today, and tonight in our HW #4 discussion session, which is at **6pm tonight @ 136 Barrows**.
- Today's Agenda
  - Finishing-up the "Carnapian Programme" stuff.
  - Inductive Logic and Inductive Epistemology (again)
  - Then: **Confirmation Theory** (also, for the rest of the semester)
    - Back to early theories of confirmation (Keynes, Nicod, Hempel)
    - Then: Contemporary (subjective) probabilistic approaches
    - The Paradoxes of Confirmation (Ravens and Grue)
    - Psychological Applications of Confirmation Theory

# Carnap's Programme for Inductive Logic/Confirmation Theory

- Carnap's desiderata for inductive logic/confirmation theory:

($\mathcal{D}_1$) Confirmation theory aims to characterize a function $\mathfrak{c}(H, E)$, which *generalizes entailment*, in the sense that $\mathfrak{c}(H, E)$ should take on a *maximal* value when $E \vDash H$, and a *minimal* value when $E \vDash \sim H$.

($\mathcal{D}_2$) The relation $\mathfrak{c}$ should be *objective* and *logical*. [For Carnap, this was contrasted with *psychological* relations — *anti-psychologism*.]

($\mathcal{D}_3$) Confirmation theory/inductive logic should be *applicable to/connected with* epistemology in some (non-trivial) way. [For Carnap, this meant that some non-trivial *bridge principle* connecting $\mathfrak{c}$ and *evidential support* should hold. He suggested the (RTE), which has problems.]

($\mathcal{D}_4$) The relation $\mathfrak{c}$ should be defined in terms of *probability*. [For Carnap, ($\mathcal{D}_1$), ($\mathcal{D}_2$), and ($\mathcal{D}_4$) implied that there must be "logical" probabilities $\Pr_{\mathsf{T}}$. Later, I will explain an alternative way to satisfy these three $\mathcal{D}$'s.]

## Inductive Logic and Inductive Epistemology (Applicability)

- Carnap originally proposed the following *bridge principle*:

(RTE$_C$) $E$ evidentially supports $H$ *for an agent* $S$ *in an epistemic context* $C$ $\iff \Pr_{\mathsf{T}}(H \mid E \,\&\, K) > r$, where $K$ is $S$'s *total evidence in* $C$.

- Popperian (*e.g.*, "rare disease") examples lead to this alteration:

(RTE$'_C$) $E$ evidentially supports $H$ *for an agent* $S$ *in an epistemic context* $C$ $\implies \Pr_{\mathsf{T}}(H \mid E \,\&\, K) > \Pr_{\mathsf{T}}(H \mid K)$, where $K$ is $S$'s *total evidence in* $C$.

- But, even this refinement of (RTE) has counterexamples. For instance, "old evidence" cases in which $K \vDash E$. We'll discuss another soon ("grue").
- This leads one to re-think the applicability desideratum ($\mathcal{D}_3$). Maybe it is misguided altogether, or maybe it's just really hard to satisfy.
- Last time, I talked about "bridge principles" in deductive logic (knowledge and $\vDash$). I pointed out that they are very difficult to articulate. Be that as it may, many still think there is *some* connection. I'll return to this later.

# Confirmation Theory I: Keynes and Nicod (Roots)

- Keynes (1921) was the first to clearly articulate a *probabilistic relevance* conception of inductive support. Nicod (1930) continued this thread.
- Nicod's three basic tenets of (instantial) confirmation were as follows:
  - Instantial confirmation is a relation between singular and general propositions/statements (or, if you will, between "facts" and "laws").
  - Confirmation consists in *positive probabilistic relevance*, and disconfirmation consists in *negative probabilistic relevance* (where the salient probabilities are inductive / *a priori* in the Keynesian sense).
  - Universal generalizations are confirmed by their positive instances and disconfirmed by their negative instances. [*The Nicod Condition* (NC)]
- These tenets (especially NC) became the basic principles of early confirmation theory. Hempel (the father of modern confirmation theory) picked-up where Nicod left off, but in a rather strange (and different) way.

# Confirmation Theory II: Hempel (The Father of $\mathfrak{c}$-Theory)

- Hempel wrote several seminal papers about confirmation theory in the 30's and 40's. This set the agenda for confirmation theory since.
- Hempel begins by discussing Nicod's views about instantial confirmation. Strangely, however, Hempel interprets Nicod's (NC) in the following way:

($NC_0$) For all objects $x$ (with names $\mathfrak{x}$), and all predicate expressions $\phi$ and $\psi$: $x$ confirms $\ulcorner(\forall y)(\phi y \supset \psi y)\urcorner$ iff $\ulcorner\phi\mathfrak{x} \,\&\, \psi\mathfrak{x}\urcorner$ is true, and $x$ disconfirms $\ulcorner(\forall y)(\phi y \supset \psi y)\urcorner$ iff $\ulcorner\phi\mathfrak{x} \,\&\, {\sim}\psi\mathfrak{x}\urcorner$ is true.

- This is a somewhat puzzling way of reading Nicod, in several respects:
  - It interprets Nicod as describing a relation between *objects* and universal claims, not between *singular claims* and universal claims.
  - It abstracts away from (and does not mention) *probabilistic relevance*.
  - It understands the notion of "positive instance" in a *conjunctive* way.
  - It leads to an absurd confirmation relation in several respects.

# Confirmation Theory II: Hempel (The Father of ¢-Theory)

- The most patent absurdity of Hempel's (NC$_0$)-reading of Nicod is that it leads to a ¢-relation that violates the *hypothetical equivalence condition*:

(EQC$_H$) If $x$ confirms $H$, then $x$ confirms anything logically equivalent to $H$.

- Hempel himself pointed this out, using the following example.
  - $a$ confirms "$(\forall y)(Fy \supset Gy)$," provided $a$ is such that $Fa \,\&\, Ga$.
  - *Nothing* can confirm "$(\forall y)[(Fy \,\&\, {\sim}Gy) \supset (Fy \,\&\, {\sim}Fy)]$," since *no object* $a$ can be such that $Fa \,\&\, {\sim}Fa$.
  - But, $(\forall y)(Fy \supset Gy) \mathrel{=\!\!|\!\models} (\forall y)[(Fy \,\&\, {\sim}Gy) \supset (Fy \,\&\, {\sim}Fy)]$.
- This means that (NC$_0$) leads to a confirmation relation that depends on *how propositions are expressed*, which seems unintuitive.
- For Hempel, confirmation is a *logical* relation, and logical relations (for Hempel) do not depend on choice of description in this sensitive way.
- Hempel gives an alternative theory of confirmation that avoids this.

# Hempelian Confirmation Theory I

- After giving-up on ($NC_0$), Hempel laid down the following *desiderata*, in addition to the Hypothetical Equivalence Condition ($EQC_H$).

  **Entailment Condition** (EC). If $E \vDash H$, then $E$ confirms $H$.

  **Special Consequence Condition** (SCC). If $E$ confirms $H$, and $H \vDash H'$, then $E$ confirms $H'$.

  **Consistency Condition** (CC). If $E$ confirms $H$, and $E$ confirms $H'$, then $H$ and $H'$ are logically consistent.

  **Non-Triviality Condition** (NTC). For all $H$, there exists an $E$ which does *not* confirm $H$.

- Because Hempel accepts these desiderata, he *must* reject the following:

  **Converse Consequence Condition** (CCC). If $E$ confirms $H$, and $H' \vDash H$, then $E$ confirms $H'$.

- Otherwise, the desiderata would be *logically inconsistent*. HW #4!
- I will discuss these desiderata critically, below. But, first, let's look at the theory Hempel comes up with, which satisfies these desiderata.

## Hempelian Confirmation Theory II

- Hempel advances an "instance" account satisfying his desiderata. The key definition behind his deductive theory of instantial confirmation is:
- The *development of a hypothesis* $H$ *for a set of individuals* $I$ [$dev_I(H)$] is (intuitively) "what $H$ says (*extensionally*) about the members of $I$".
- $dev_I(H)$ is obtained by (*i*) *conjoining* all the $I$-instances of $H$, if $H$ is a *universal* ($\forall$) claim, and (*ii*) *disjoining* all the $I$-instances of $H$, if $H$ is an *existential* ($\exists$) claim. [$I$-instances of $H$ are basic sentences that *satisfy* $H$.]
- Satisfaction is *semantical* ("*makes true*") *not* syntactical (*contra* $\mathrm{NC}_0$). If $H \mathrel{=\joinrel|\joinrel\models} H'$, they have the same $I$-instances (say the same things about $I$).
- Let $I = \{a, b\}$, then we have:
  - If $H = (\forall x)Bx$, then $dev_I(H) = Ba \,\&\, Bb$.
  - If $H = (\exists x)Rx$, then $dev_I(H) = Ra \vee Rb$.
  - If $H = (\forall x)(\exists y)Lxy$, then (working from the outside-in):

$$dev_I(H) = (\exists y)Lay \,\&\, (\exists y)Lby = (Laa \vee Lab) \,\&\, (Lba \vee Lbb)$$

# Hempelian Confirmation Theory III

- **Def.** $E$ *directly-Hempel-confirms* $H$, just in case $E \vDash dev_I(H)$ for the class $I$ of individuals mentioned in $E$. $E$ *Hempel-confirms* $H$ iff $E$ directly Hempel confirms every member of a set of sentences $S$ such that $S \vDash H$.

- Why the two definitions? $Ra \,\&\, Ba$ does *not directly* Hempel-confirm $Rb \supset Bb$, but $Ra \,\&\, Ba$ *does* Hempel-confirm $Rb \supset Bb$ ($\alpha$-variants).

- Problematic Examples for Hempel's Theory:
  - Let $I = \{a, b\}$, $H = (\forall x)(\forall y)Rxy$, $E \overset{\text{def}}{=} Raa \,\&\, Rab \,\&\, Rbb \,\&\, Rba$, $E' \overset{\text{def}}{=} Raa \,\&\, Rab \,\&\, Rbb$, and $E'' \overset{\text{def}}{=} Raa$. Then, $E''$ confirms $H$, $E'$ does not confirm $H$, and $E$ does confirm $H$. Make sure you see why.
  - *No consistent* $E$ can confirm the following, which is *true* on $\mathbb{N}$,

$$(H)\quad (\forall x)(\exists y)x < y \,\&\, (\forall x)x \not< x \,\&\, (\forall x)(\forall y)(\forall z)[(x < y \,\&\, y < z) \supset x < z]$$

    since $\text{dev}_I(H)$ *is inconsistent, for any finite $I$*! Exercise: Prove this!

- The Paradoxes of Confirmation pose deeper problems for Hempel.

# Hempelian Confirmation Theory IV

- **The Paradox of the Ravens**: Consider the hypothesis that all ravens are black, $H$: $(\forall x)(Rx \supset Bx)$. Which of these 6 claims Hempel-confirms $H$?

| | | |
|---|---|---|
| $E_1$: $Ra \,\&\, Ba$ | $E_2$: $\sim Ra$ | $E_3$: $Ba$ |
| $E_4$: $\sim Ra \,\&\, \sim Ba$ | $E_5$: $\sim Ra \,\&\, Ba$ | $E_6$: $Ra \,\&\, \sim Ba$ |

  Answer: *All but $E_6$ Hempel-confirm $H$*! Make sure you see why.

- **Goodman's New Riddle of Induction**: Consider the hypothesis that all ravens are "blite", where the predicate "blite" ($B$) is defined as follows:

  > $x$ is blite iff *either* (*i*) $x$ is examined before (the end of) today, and $x$ is black *or* (*ii*) $x$ is examined after today, and $x$ is white.

  $Ra \,\&\, Ba$ Hempel-confirms $H$. The observation of a black raven today confirms the hypothesis that ravens observed tomorrow will be white?!?

- We'll discuss these infamous historical paradoxes in great depth soon ...

- Also: $Ra \,\&\, Ba$ Hempel-confirms $(\forall x)[\phi x \supset Bx]$, for *any* $\phi$.

# Hempel's Desiderata — Critical Discussion

- Probabilistic accounts of confirmation will accept some of Hempel's desiderata, but they will reject others. And, these rejections are *intuitive*.
- The EQC, the EC, and the NTC all seem quite intuitive, and they are satisfied by any probabilistic account of confirmation. Prove this!
- CC is *not* intuitive. Typically, competing theories are *not* consistent. Still, it is often the case that evidence confirms several competing theories, though it may confirm some *more strongly* than others.
- Example: $E$ = card is black, $H$ = card is the A♠, $H'$ = card is the J♣. Intuitively, $E$ confirms both $H$ and $H'$, even though they are inconsistent.
- SCC is not intuitive either. Many intuitive counterexamples are out there. *E.g.*, $E$ = card is black, $H$ = card is card is the A♠, and $H'$ = card is an ace.

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- As for CCC, it is *highly un*intuitive (here, we agree with Hempel). *E.g.*, $E$ = card is the A♠, $H$ = card is card is an ace, and $H'$ = card is the A♦.

## A Catalogue of Properties of Confirmation Relations I

($M_E$) If $E$ confirms $H$ relative to $K$, then $E \,\&\, E'$ confirms $H$ relative to $K$ (provided that $E'$ does not contain any constant symbols not contained in $\{H, E, K\}$).

($M_K$) If $E$ confirms $H$ relative to $K$, then $E$ confirms $H$ relative to $K \,\&\, K'$ (provided that $K'$ does not contain any constant symbols not contained in $\{H, E, K\}$).

(NC) $\ulcorner \phi x \,\&\, \psi x \urcorner$ confirms $\ulcorner (\forall y)(\phi y \to \psi y) \urcorner$ relative to (some/all/specific) $K$.

(SCC) If $E$ confirms $H$ relative to $K$ and $H \vDash_K H'$, then $E$ confirms $H'$ relative to $K$.

(CCC) If $E$ confirms $H$ relative to $K$ and $H' \vDash_K H$, then $E$ confirms $H'$ relative to $K$.

(CC) If $E$ confirms $H$ relative to $K$ and $E$ confirms $H'$ relative to $K$, then $K \nvDash \sim(H \,\&\, H')$.

(CC′) If $E$ confirms $H$ relative to $K$ and $E$ confirms $H'$ relative to $K$, then $K \nvDash \sim(H \equiv H')$.

(EC) If $E \vDash_K H$, then $E$ confirms $H$ relative to $K$.

(CEC) If $H \vDash_K E$, then $E$ confirms $H$ relative to $K$.

($EQC_E$) If $E$ confirms $H$ relative to $K$ and $K \vDash E \equiv E'$, then $E'$ confirms $H$ rel. to $K$.

($EQC_H$) If $E$ confirms $H$ relative to $K$ and $K \vDash H \equiv H'$, then $E$ confirms $H'$ rel. to $K$.

(EQC$_K$) If $E$ confirms $H$ relative to $K$ and $K \dashv\vDash K'$, then $E$ confirms $H$ relative to $K'$.

(NT) For some $E$, $H$, and $K$, $E$ confirms $H$ relative to $K$. And, for every $E/K$, there exists an $H$ such that $E$ does *not* confirm $H$ relative to $K$.

(ST) If $E$ confirms $H$ relative to $K$ and $E$ confirms $H$ relative to $\sim K$, then $E$ confirms $H$ relative to $\top$.

- The monotonicity properties (M$_E$) and (M$_K$) are satisfied by Hempel's theory of confirmation. It is worth examining why this is the case.
- As it turns out, the monotonicity properties are not desirable for confirmation relations — even by Hempel's own lights, as we'll soon see.
- This is an important (and embarrassing) fact about Hempel's theory — one which is not shared by Pr-accounts (probability is *non-monotonic*!).
- (CC$'$) is something that *is* satisfied by probabilistic accounts. Why?
- Interestingly, (ST) is *violated* by probabilistic relevance (PR) accounts. But, it is satisfied by the conditional-probability-threshold (CPT) account. Why?
- Does Hempel's theory satisfy (ST)? Why/why not? How about CPT?

# Hypopthetico-Deductive (HD) Confirmation

- The general form of a deductive (*i.e.*, H-D) prediction is:

  $H$. Hypothesis under test.
  
  $K$. Background assumptions (initial conditions, *etc.*).
  
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  $E$. Observational (deductive) prediction.

- We can also look at the "reverse inference", *from* the observation $E$ *to* the hypothesis $H$ (*given* $K$). NOTE: this direction is *inductive* (double-line)!

  $E$. Observational (deductive) prediction.
  
  $K$. Background assumptions (initial conditions, *etc.*).
  
  ===
  
  $H$. Hypothesis under test.

- The basic idea: $E$ HD-confirms $H$, relative to $K$ iff $H \vDash_K E$. Note how this has $H$ on the left of a $\vDash$, whereas Hempel's has $E$ on the left. This is a crucial difference. Think about (SCC) and (CCC) for the two theories.

- This is merely a *qualitative* claim, that $E$ confirms $H$, relative to $K$ (to some positive degree or other — like Hempel's qualitative theory).

# A Catalogue of Properties of Confirmation Relations II

| | Does Concept Satisfy Condition? | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Concept | EQC | EC | CC | NT | SCC | CCC | CEC | M | NC | CC′ | ST |
| Hempel | Yes | Yes | Yes[a] | Yes | Yes | No | No | Yes | Yes | Yes[a] | Yes |
| HD | Yes | No | No | Yes | No | Yes | Yes | No | No | Yes[e] | Yes |
| CPT | Yes | Yes[b] | No | Yes | Yes | No | No | No | No | Yes[d] | Yes |
| PR | Yes | Yes[c] | No | Yes | No | No | Yes[c] | No | No | Yes | No |

[a] Assuming that $E \,\&\, K$ is not self-contradictory.
[b] Assuming that $\Pr(E \mid K) \neq 0$.
[c] Assuming that $\Pr(H \mid K) \in (0,1)$, and $\Pr(E \mid K) \in (0,1)$.
[d] Assuming that $t \geqslant \frac{1}{2}$.
[e] Assuming that $K \nvDash E$.

# The Raven Paradox (aka., The Paradox of Confirmation)

- **Nicod Condition** (NC): For any object $x$ and any properties $F$ and $G$, the proposition that $x$ has both $F$ and $G$ confirms the proposition that every $F$ has $G$. Strong second-order condition:

  $(\forall F)(\forall G)(\forall x)[Fx \,\&\, Gx \text{ confirms } (\forall x)(Fx \supset Gx)]$

- **Equivalence Condition** (EC): For any propositions $H_1$, $E$, and $H_2$, if $E$ confirms $H_1$ and $H_1$ is (*classically!*) logically equivalent to $H_2$, then $E$ confirms $H_2$. Weak $2^{nd}$ order condition:

  $(\forall E)(\forall H_1)(\forall H_2)[E \text{ confirms } H_1 \text{ and } H_1 \dashv\vDash H_2 \Rightarrow E \text{ confirms } H_2]$

- **Paradoxical Conclusion** (PC): The proposition that $a$ is both nonblack and a nonraven confirms the proposition that every raven is black. This is a first-order condition (arbitrary $a$): $\sim Ba \,\&\, \sim Ra$ confirms $(\forall x)(Rx \supset Bx)$.

**Proof**. (1) By (NC), $\sim Ba \,\&\, \sim Ra$ confirms $(\forall x)(\sim Bx \supset \sim Rx)$.

(2) By Classical Logic, $(\forall x)(\sim Bx \supset \sim Rx) \dashv\vDash (\forall x)(Rx \supset Bx)$.

$\therefore$ (PC) By (1), (2), (EC), $\sim Ba \,\&\, \sim Ra$ confirms $(\forall x)(Rx \supset Bx)$.

- Hempel & Goodman *embraced* (NC), (EC) *and* (PC). They saw **no paradox**. Hempel *explains away* the paradoxical *appearance* (Goodman does same):

  > ... in the seemingly paradoxical cases of confirmation, we are often not judging the relation of the given evidence $E$ *alone* to the hypothesis $H$ ... instead, we tacitly introduce a comparison of $H$ with ... $E$ in conjunction with ... additional ... information we ... have at our disposal.

- Hempel's Idea: $E$ [$\sim Ra \,\&\, \sim Ba$] confirms $H$ [$(\forall x)(Rx \supset Bx)$] *relative to* $\mathsf{T}$, but $E$ doesn't confirm $H$ relative to some (nontautological) $K \neq T$.

- *Which* $K \neq \mathsf{T}$? Later, Hempel discusses $K = \sim Ra$. Intuition: if you already know that $a$ is a nonraven, then observing its color will not tell you anything about the color of ravens. Hempel: (PC) is true, but (PC*) is false:

(PC) $\sim Ra \,\&\, \sim Ba$ confirms $(\forall x)(Rx \supset Bx)$, relative to $\mathsf{T}$.

(PC*) $\sim Ra \,\&\, \sim Ba$ confirms $(\forall x)(Rx \supset Bx)$, relative to $\sim Ra$.

- This is a good insight! Unfortunately, it is *logically incompatible* with the (deductive) confirmation *theories* that Hempel and Goodman accept.

- Specifically, this possibility contradicts the *K-monotonicity* property:

($M_K$) $E$ confirms $H$, relative to $\top \Rightarrow E$ confirms $H$ relative to *any* $K$ (provided that $K$ does not mention any individuals not already mentioned in $E$).

- Because Hempel's theory of confirmation satisfies (M), his theory implies that (PC) entails (PC*). So, it is logically impossible for Hempel's theory to undergird his suggestion that (PC) is true, while (PC*) is false.
- This is bad news for Hempel/Goodman. Surprisingly, nobody noticed this inconsistency in the Hempel/Goodman approach to the paradox.
- As we will see shortly, *Bayesians* can better accommodate Hempel's intuitions here, since *their* theory of confirmation does *not* satisfy (M).
- Interestingly, later in this very same passage, Hempel offers an argument for premise (1) which, itself, *depends on* this very monotonicity property!

  If ... $E$ consists *only* of one ... nonraven [$\sim Ra$], then $E$ ... confirm[s] that all objects are nonravens [$(\forall x)\sim Rx$], and *a fortiori* $E$ supports the weaker assertion that all nonblack objects are nonravens [$(\forall x)(\sim Bx \supset \sim Rx)$].

- The dependence on (M) is almost invisible here! My conjecture: (M) is a vestige of "objectual" ways of thinking about confirmation (like $NC_0$).

- This independent argument for (1) presupposes not only (M), but (SCC):

(SCC) $(\forall E)(\forall H_1)(\forall H_2)[E \text{ confirms } H_1 \text{ and } H_1 \vDash H_2 \Rightarrow E \text{ confirms } H_2]$.

- To see this, take a closer look at the reasoning of the argument:

(1.1) $\sim Ra$ confirms $(\forall x)\sim Rx$. (Nicod)

(1.2) $(\forall x)\sim Rx \vDash (\forall x)(\sim Bx \supset \sim Rx)$ (Logic)

(1.3) $\sim Ra$ confirms $(\forall x)(\sim Bx \supset \sim Rx)$ (SCC)

(1) $\sim Ra \,\&\, \sim Ba$ confirms $(\forall x)(\sim Bx \supset \sim Rx)$ (M?!)

- (M) and (SCC) are consequences of Hempel's (and Goodman's) confirmation theory, which says $E$ confirms $H$ iff $E \vDash \text{dev}_E(H)$.

- Modern Bayesians *reject both* (M) *and* (SCC). And, as a result, Bayesians are able to say what Hempel wanted to say (but can't!).

- Before Bayesianism, we'll look briefly at Scheffler [who accepts (NC), but denies (EC)], and Quine [who accepts (EC), but denies (NC)].

- Then, we'll look at Bayesian resolutions of several different kinds. Some of these will reject (NC), while others will take a different tack.

- Scheffler rejects (PC), but accepts (1). He denies (EC). He proposes:

  (*) A Hempelian positive instance ($E$) of a $\forall$-hypothesis ($H$) confirms $H$, *unless $E$ is also a positive instance of the contrary ($H'$) of $H$*.

- Let $H$: $(\forall x)[Rx \to Bx]$. The contrary of $H$ is $H'$: $(\forall x)[Rx \to {\sim}Bx]$. Let $E$: ${\sim}Ra \mathbin{\&} {\sim}Ba$. $E$ is a Hempelian positive instance of $H$, *and* $H'$.

- Thus, according to Scheffler's (*), $E$ does not confirm $H$ after all.

- Scheffler accepts (1) [and (NC)]. $E$ confirms $H^*$: $(\forall x)[{\sim}Bx \to {\sim}Rx]$ — *even according to* (*). This is because $E$ is *not* a Hempelian positive instance of the *contrary* of $H^*$, $H^{*\prime}$: $(\forall x)[{\sim}Bx \to Rx]$.

- This leads to a violation of (EC), of course, since – according to (*) – $E$ confirms $H^*$, but $E$ does not confirm $H$ — even though $H \mathrel{=\!\!|\!\!\models} H^*$.

- Is Scheffler's (*) true? **Exercise**: show that Scheffler's (*), and (NC) are both *false* from the point of view of PR-theory. I'll return to this when we discuss I.J. Good and (NC). This will be one of the many subtle (and non-Hempelian) aspects of of probabilistic relevance accounts of $\mathfrak{c}$.