Eric Anderson

Explanatoriness is evidentially irrelevant, or inference to the best explanation meets Bayesian confirmation theory

William Roche and Elliott Sober

(E) If *H* and *O* were true, *H* would explain *O*

Is *E* evidence for *H*?

According to Bayesian confirmation theory, if *E* is evidence for *H*, then:

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$Pr(H|E) > Pr(H)$ Not plausible unless we know *O* is true

(E) If H and O were true, H would explain O

Is E evidence for H?

According to Bayesian confirmation theory, if E is evidence for H, then:

$Pr(H|O\&E) > Pr(H)$ Doesn't imply that E is evidentially relevant

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Is *E* evidence for *H*?

According to Bayesian confirmation theory, if *E* is evidence for *H*, then:

$\Pr(H|O\&E) > \Pr(H|O)$ This is the correct formulation

(E) If *H* and *O* were true, *H* would explain *O*

Is *E* evidence for *H*?

According to Bayesian confirmation theory, if *E* is evidence for *H*, then:

$Pr(H|O\&E) > Pr(H|O)$ Roche and Sober argue this inequality is FALSE

Instead, they argue

$Pr(H|O\&E) = Pr(H|O)$ i.e. O *screens off E* from *H*

The explanitoriness of *H* is evidentially idle, given *O*

E is **not** evidence for *H*

Example: smoking and lung cancer

Suppose frequency data show a **correlation** between smoking and lung cancer

Pr(*S* smoked at least 10,000 cigarettes before age 50 | *S* got lung cancer after age 50) = ***c***

If the fact that smoking *explains* lung cancer were evidentially relevant, then

Pr(*S* smoked at least 10,000 cigarettes before age 50 | *S* got lung cancer after age 50 & if *S* smoked at least 10,000 cigarettes before age 50 and *S* got lung cancer subsequently, then the smoking would explain the lung cancer) **>** ***c***

Example: smoking and lung cancer

Suppose frequency data show a **correlation** between smoking and lung cancer

Supported by frequency data → Pr(*S* smoked at least 10,000 cigarettes before age 50 | *S* got lung cancer after age 50) = ***c***

If the fact that smoking *explains* lung cancer were evidentially relevant, then

Not supported by frequency data → Pr(*S* smoked at least 10,000 cigarettes before age 50 | *S* got lung cancer after age 50 & if *S* smoked at least 10,000 cigarettes before age 50 and *S* got lung cancer subsequently, then the smoking would explain the lung cancer) **>** ***c***

FALSE

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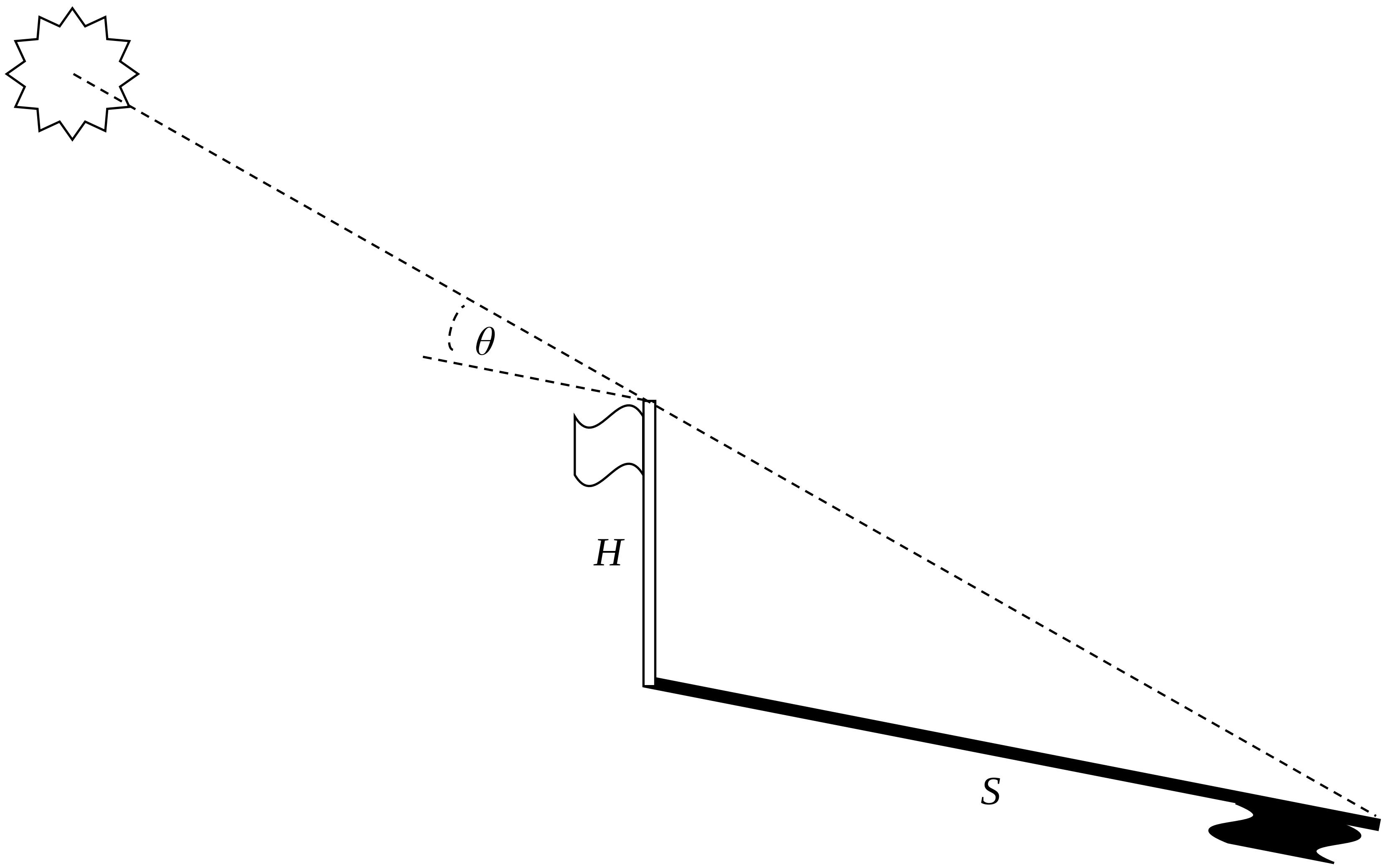
TRUE

The example assumes a causal notion of explanation: if smoking causes cancer, then smoking *explains* cancer.

As we all know, causation—and hence, causal explanation—is *asymmetric*.



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As we all know, causation—and hence, causal explanation—is *asymmetric*.

But [Bayesian] confirmation is *symmetric*

$Pr(Y|X) > Pr(Y)$ *if and only if* $Pr(X|Y) > Pr(X)$

Hence, it is no surprise that the Bayesian confirmation relation is indifferent to the explanatory relation.

DN explanation fares no better:

Knowing that *H* entails *O*—and so explains *O*, on the DN model—gives us information about confirmation.

But it is the entailment relationship that does the work, and entailment relationships are already "baked into" the probabilities.

If *E* is the proposition that *H* entails *O*, then

$\Pr(H|O\&E) = \Pr(H|O)$ *Screening off still holds*

If *I* is the proposition that *O* entails *H*, then

$\Pr(H|O\&I) = \Pr(H|O)$ *Screening off still holds*

Roche and Sober concede that screening-off isn't an appropriate test for purely logical facts, like entailment relationships.

But they insist that *explanation is more than a purely logical relationship*.

Recall Van Fraassen’s argument that a confirmational explanatoriness bonus renders one vulnerable to a Dutch book.

The Roche and Sober argument is supposed to show that such a bonus is impossible, without appealing to a Dutch book argument.

What if explanatoriness plays a role in the priors?

- Today's priors are yesterday's posteriors
- First priors are assigned on the basis of no observation

So much the worse for Bayesianism?

If defenders of IBE want explanatoriness to play a role in confirmation,

they need to formulate a non-Bayesian theory of confirmation.

Gems


You know what they’re going to do just by reading the title


Short and sweet


Many potential objections considered

Questions and Critique

- Is proposition *E* the sort of proposition that can participate in a probabilistic analysis?
- If explanatoriness is more than a logical relationship between *H* and *O*—say, a relationship rooted in material facts—then won't "observing" *E* involve observing new facts that will influence the posterior of *H*?
- Recall Lipton's thesis that explanatory loveliness is a *guide* to probabilistic likeliness. Does the Roche/Sober argument contend with this idea?
- IBE is used to *contrast different hypotheses*: more explanatory hypotheses are supposed to be better (confirmed) than less explanatory ones. It seems extremely odd to contrast a hypothesis with *itself* in conjunction with *E*.