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[16] Confirmation (ctd.)

0. Outline

1. Bayesians on the Ravens

- Last time:
  - outline of Bayesian account of confirmation + some associated properties (e.g. falsity of **NC**; restricted version of Tacking problem),
  - outline of Bayesian accounts of *degree of* confirmation,
  - outline of a general Bayesian strategy for coping with counterintuitive consequences of their account of confirmation:

    endorse truth of consequence but appeal to quantitative considerations to explain counterintuitive character of consequences.

1. Bayesians on the Ravens

- Fitelson [2006] shows how Bayesians have applied this strategy to the Ravens.
- Note: there are many *different* Bayesian strategies that I won't discuss (see Vranas [2004] for references).
- The basic idea:
  - Grant that it is *true* that:

    $\neg R(a)$ & $\neg B(a)$ confirms $(\forall x)\ (R(x) \supset B(x))$ (i.e.(v))
  - Claim that we nevertheless *think that (v) is false* because, given our actual background knowledge *K*:

    $c((\forall x)\ (R(x) \supset B(x)), \neg R(a)\ \&\ \neg B(a)) \approx 0$.

    (This should really be: 'given what we *think* our background knowledge is, *we judge it to be the case that*' - nevermind.)

1. Bayesians on the Ravens

- This is supposed to stand in contrast with our intuitions concerning:

  $R(a)$ & $B(a)$ confirms $(\forall x)\ (R(x) \supset B(x))$

  (also true but with a substantially greater degree of confirmation involved)
- Note: this is the '*quantitative*' response; there is also a purely *comparative* response, that tries to establish

  $c((\forall x)\ (R(x) \supset B(x)), R(a)\ \&\ B(a)) > c((\forall x)\ (R(x) \supset B(x)), \neg R(a)\ \&\ \neg B(a))$
- I don't like the quantitative move but I think *this* is even worse.
- I'll tell you why later (similar move attempted for the Tacking paradox).

1. Bayesians on the Ravens

- The assumptions made to derive the results:

  Independence 1: $\text{Bel}_{S,K}(\text{R}(a)|(\forall x)\ (R(x) \supset B(x))) = \text{Bel}_{S,K}(\text{R}(a))$ (i.e. learning that all ravens are black shouldn't affect our confidence in an object selected at random turning out to be a raven)

  Independence 2: $\text{Bel}_{S,K}(\neg\text{B}(a)|(\forall x)\ (R(x) \supset B(x))) = \text{Bel}_{S,K}(\text{R}(a))$ (i.e. same story as above, but regarding our confidence in an object selected at random turning out to be a non-black)

  Class size: $\text{Bel}_{S,K}(\neg B(a)) >> \text{Bel}_{S,K}(R(a))$ (i.e. given what we know, we should be *far* more confident that an object selected at random will turn out to be non-black than we should be that it will turn out to be a raven)

1. Bayesians on the Ravens

- It then follows, on the assumption that degree of confirmation is adequately captured by measures *d*, *r*, *l*, or *s*, that:

  $c((\forall x)\ (R(x) \supset B(x)), \neg R(a)\ \&\ \neg B(a)) \approx 0.$

  (and that $c((\forall x)\ (R(x) \supset B(x)), R(a)\ \&\ B(a)) >> c((\forall x)\ (R(x) \supset B(x)), \neg R(a)\ \&\ \neg B(a)))$
- Note:
  - as we saw last time, **NC** is false according to **BayesQual**;
  - however, given the *additional* assumptions made here, $\neg R(a)$ & $\neg B(a)$ does confirm $(\forall x)\ (\neg B(x) \supset \neg R(x))$ And hence, by **EQC**, $(\forall x)\ (R(x) \supset B(x))$ (as Fitelson [2006] notes).
- What do you reckon to the response?

1. Bayesians on the Ravens

- I am unhappy with it (for reasons analogous to those underpinning my unhappiness wrt Hempel's attempted solution):
- It *also* establishes that

  $c((\forall x)\ (\neg\text{B}(x) \supset \neg\text{R}(x)), \neg R(a)\ \&\ \neg B(a)) \approx 0.$
- But 'observing a non-black non-raven is evidence that all non-black things are non-ravens' seems ok, intuitively.

2. Bayesians on the Tacking problem

- We saw last time that, as HD-ists and Hempelians before them, Bayesians typically analyse statements of the form '*E* is evidence for *H*' as asserting the existence of a binary relation of evidential support:

  BayesQual: *E* confirms *H* wrt *K* iff $Bel_{S,K}(H|E) > Bel_{S,K}(H)$. *E* disconfirms *H* for *S* at *t* iff $Bel_{S,K}(H|E) < Bel_{S,K}(H)$. (where $Bel_{S,K}$ is the belief function that any agent *S* rationally ought to have given background knowledge *K*)
- And as we saw last time (for any *E*, *H* and *H**):

  [T16] According to **BayesQual**, given certain very weak assumptions about the relevant rational belief function, if *H* entails *E*, then *E* confirms both *H* and *H&H**.

2. Bayesians on the Tacking problem

- And this, as we have seen, has the counterintuitive consequence that the following comes out true:

  A1: 'That you have at least three red cards is evidence that you have a handful of red cards and a pocketful of pennies'.
- Aside: note that, by virtue of **BayesQual**'s commitment to:

  Provided that $0 < Pr(H) < 1$ and $0 < Pr(E) < 1$, if $H \vDash E$, then *E* confirms *H*.

  it *also* judges the following true:

  A2: 'That you have at least three red cards is evidence that you have a handful of hearts.'

2. Bayesians on the Tacking problem

- In fact, the Tacking problem for Bayesianism generalises:

  [T17]: According to **BayesQual**, given certain very weak assumptions about the relevant rational belief function, if *E* confirms *H*, it also confirms any logically stronger proposition H^+ that is 'screened off' from *E* by *H.*
- Typical Bayesian move: *H* is 'more' supported by *E* than *H* & *H** is. (i.e. merely *comparative* rather than quantitative move)

  'Bayesians do have some wiggle room, however. They can concede [that if *H* entails *E* then *E* confirms *H&H** for any *E*, *H* and *H**], but argue that in the context of deductive evidence, *H* simpliciter will always be better confirmed than *H*[&*H**].' (Hawthorne & Fitelson [2004])

2. Bayesians on the Tacking problem

- Fitelson & Hawthorne [2004] prove (for any, *E*, *H*, *H**):

  [T18] According to two popular versions of **BayesQuant** and given certain weak assumptions about the relevant rational belief function, then, according to **BayesQual**, if *E* confirms *H* and *H&H** is 'screened off' from *E* by *H* (e.g. when *H* entails *E*), then *E* confirms *H&H** *less* than it does *H.*
- Two problems here…
- *Small problem*: measure-sensitivity.
- The above theorem does *not* hold, for instance, if $c(H,E) = r(H,E) = \log [Bel_{S,K}(H|E) / Bel_{S,K}(H)]$.
- Hence it had better not turn out to be the case that good arguments can be given for $\textbf{BayesQuant}_{\textbf{r}}$.

2. Bayesians on the Tacking problem

- *Big problem*: it isn't clear how the *merely comparative* claim can be claimed to address our qualitative intuitions in the first place.
- Had a *quantitative* claim been established (e.g. $c(H\&H^*,E) \approx 0$ for the relevant counterintuitive cases) as it was in the context of the Ravens, one might *conceivably* have wanted to grant to response.
- But this is a non-starter!
- Compare:

  DOUBTER: 'Your qualitative account of debt, DebtQual, has the consequence that if *a* is indebted to *b*, then *a*'s next-door neighbour is also indebted to *b*. But that's ridiculous!'

2. Bayesians on the Tacking problem

THEORIST: 'Yes perhaps so, but note that on my account of *degree of* debt, DebtQuant, *a*'s next-door neighbour turns out to be *less* indebted to *b* than *a* is.'

DOUBTER: <is unimpressed>

- Another approach: 'contrastive confirmation' (Chandler [2007]).
- Some background…

3. Bayesian contrastive confirmation

- A problem for **BayesQual**: explicitly contrastive constructions.

  A3: 'The fact that Pierre prefers pizza to pasta is evidence that he will order pizza rather than pasta'.
- How does one deal with these?
- Very little done on the topic so far.
- One exception: the Law of Likelihood (Hacking [1965], Sober [1990], Royall [1997]).

  LL: E confirms that H_1 rather than H_2 iff $\mathrm{Bel}_{S,K}(E,H_1) > \mathrm{Bel}_{S,K}(E,H_2)$.

  (Note: $\mathrm{Bel}_{S,K}(E,H)$ is known as the 'likelihood' of H)
- Problems: (i) no defense: taken to be self-evident, (ii) no consideration of competing analyses.

3. Bayesian contrastive confirmation

- Fitelson [forthcoming] provides a recipe for generating such competitors:

  (†): E confirms that H_1 rather than H_2 iff $c(H_1,E) > c(H_2,E)$.

  In other words: E is evidence that H_1 rather than H_2 if and only if E is better evidence that H_1 than it is evidence that H_2.

Appendix: precise versions of some theorems cited

[T16] For any E, H and H^*, if [1] $H \vDash E$ and [2] $0 < Bel_{S,K}(E) < 1$, then [3] $Bel_{S,K}(H|E) > Bel_{S,K}(H)$ and $Bel_{S,K}(H\&H^*|E) > Bel_{S,K}(H\&H^*)$.

[T17] For any E, H and H^*, if [1] $Bel_{S,K}(H{:}E) > Bel_{S,K}(H)$, [2] $Bel_{S,K}(H|H^+) = 1$, [3] $Bel_{S,K}(E|H\&H^+) = Bel_{S,K}(E|H)$, [4] $Bel_{S,K}(H^+) > 0$, [5] $Bel_{S,K}(H) > 0$, [6] $Bel_{S,K}(E) > 0$, [7] $Bel_{S,K}(H^+\&H) > 0$, and [8] $Bel_{S,K}(H^+|E) > 0$, then [9] $Bel_{S,K}(H^+|E) > Bel_{S,K}(H^+)$.

[T18]: For any E, H and H^*, if [1] $c(H,E) = d(H,E)$ or $c(H,E) = l(H,E)$, [2] $Bel_{S,K}(H|E) > Bel_{S,K}(H|{\sim}E)$, [3] $Bel_{S,K}(E|H\&H^*) = Bel_{S,K}(E|H)$, and [4] $Bel_{S,K}(H^*|H) < 1$, then [5] $c(H,E) > c(H\&H^*, E)$.

Reference

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- Vranas, P. [2004]: ‘Hempel's Raven Paradox: A Lacuna in the Standard Bayesian Solution’, *British Journal for the Philosophy of Science* 55: 545–560.

Next lecture: ‘Confirmation (ctd.) + The Lottery Paradox’

- No set reading.