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[13] Updating Belief (ctd) + Confirmation

0. Outline

1. Updating belief (ctd.)

2. Confirmation theory: non-Bayesian approaches

1. Updating belief (ctd.)

- Last lecture:
  - a recommendation for updating belief functions – strict conditionalisation (**SC**) - given the acquisition of new items of knowledge.
  - a recommendation for updating belief functions – Jeffrey conditionalisation (**JC**) - that accommodates changes in epistemic situations that license less than certain opinions.
- Like **SC**, attempts have been made to justify **JC** with a diachronic DBA, which is also extremely controversial.
- Like **SC**, **JC** entails *rigidity*: the various conditional degrees of belief given the members of the updated partition shouldn't change from t to t+1.

1. Updating belief (ctd.)

- Unlike **SC**, it turns out that **JC** is *non-commutative*: the order in which changes to our epistemic situation occur matters.
- This has led to a debate as to whether or not **JC** is a sensible recommendation.
- I won't go into this.
- See e.g. van Fraassen [1989] and Lange [2000] if you are interested, the former arguing that **JC** is thereby problematic and the latter that it isn't.
- Finally, some also argue that even **JC** isn't general enough.
- It cannot accommodate cases in which changes to one's epistemic position require a change in conditional degrees of belief. (see Bradley [2005])

1. Updating belief (ctd.)

- The basic idea behind attempts to accommodate these cases:

  S should move to the belief function compatible with the required changes that *minimises deviation* from the original belief function.

- The issue is then to find an appropriate measure of deviation.
- There are a number of popular choices available, which all yield **JC** and **SC** as special cases (but otherwise disagree).
- See Howson & Urbach or Weisberg readings on moodle.

2. Confirmation theory: non-Bayesian approaches

- The issue of graded belief and rational requirements thereon is interesting in its own right.
- The conceptual machinery of Bayesianism has also been seen to be valuable in virtue of its application to the analysis of the concept of *evidential support*.
- The branch of Bayesianism that is concerned with such matters: *Bayesian confirmation theory*.
- Why 'confirmation'?
- Reflects a historical concern with the relation between scientific theories and evidence, traditionally known as 'confirmation'.

2. Confirmation theory: non-Bayesian approaches

- I will stick to this usage in order to preserve consistency with the literature (bearing in mind that '*E* confirms *H*' stands for '*E* evidentially supports / provides some evidence for *H*').
- Note: it is commonly held that when we say that the truth of some proposition *E* is evidence for the truth of some other proposition *H*, there is an implicit relativisation being made to one's background knowledge *K*.
- E.g.: If we *don't* know that Dodgy Derrick has a touch of Alzheimer's, his constant shaking during police interview lends weight to the claim that he is guilty. Not so, it seems, if we *do* know about his medical condition.
- I'll leave this relativisation implicit in what follows, unless necessary.

2. Confirmation theory: non-Bayesian approaches

- As a backdrop to our discussion of Bayesian confirmation theory: two non-Bayesian alternatives.
- These are:
  - The *hypothetico-deductive* account
  - The *instance-confirmation* account
- Very straightforward idea behind the HD account:
  - hypotheses generate predictions.
  - if the predictions turn out to be false, the hypotheses are undermined (falsified in fact).
  - if the predictions turn out to be true, the hypotheses are supported (falsification averted!).

2. Confirmation theory: non-Bayesian approaches

- In other words:

  HD confirmation: E confirms H iff (i) E isn't a tautology and H isn't a contradiction and (ii) $H \vDash E$; E disconfirms H iff $\neg E$ confirms H (i.e. iff $H \vDash \neg E$).
- Note #1: strictly speaking, we should relativise to background K (E confirms H wrt K) and (ii) should be $H\&K \vDash E$.
- Note #2: switch to logical rather than set-theoretic notation ($H \vDash E$ rather than $H \subseteq E$), to preserve consistency with literature.
- Why (i)? Because:

  (a) if $\vDash \neg H$, then, for any E, $H \vDash E$, hence without (i) we would have my lecturing today supports the claim that I both exist and don't exist.

2. Confirmation theory: non-Bayesian approaches

(b) if $\vDash E$, then for any H, $H \vDash E$ hence without (i) we would have it's being the case that I either exist or don't exist supports the claim that Gordon Brown is PM.

- Application of **HD confirmation**:
  - Finding out that Darren is a dodo ($\neg E$) would be falsify the claim that there are no longer any dodos alive (H).
  - Correspondingly, finding out that Darren *isn't* a dodo (E) would tend to *support* that claim (albeit *very* weakly).
- Sounds sensible?

2. Confirmation theory: non-Bayesian approaches

- Some problems…
- The account seems too lenient. For example:
  - *Irrelevant conjunction (aka 'Tacking problem')*: on this view, for any E, H and H^*, if E confirms H, then E confirms $H\&H^*$

    E.g.: if the fossil record supports the thesis that we share common ancestors with chimpanzees, then the fossil record supports the thesis that we share common ancestors with chimpanzees and donkeys.

    Proof: for any E, H and H^*, if $H \vDash E$, then $H\&H^* \vDash E$.
  - *Irrelevant disjunction*: on this view, for any E, H and E^*, if E confirms H, then $E \vee E^*$ confirms H.

2. Confirmation theory: non-Bayesian approaches

E.g.: If my being in town the night of the crime supports the hypothesis that I am guilty, then my being either in town or out of town the night of the crime also supports that hypothesis.

Proof: for any E, H and E^*, if $H \vDash E$, then $H \vDash E \vee E^*$.

Grimes [1990] attempts to modify **HD confirmation** to deal with these cases.

- The account seems too strict. For example:
  - *Non-universally quantified hypotheses*: Quentin's being a liar provides some support for the hypothesis that most men are liars but the latter doesn't entail the former.

2. Confirmation theory: non-Bayesian approaches

- Unhappy with the HD account, Hempel [1945] sets out to find an alternative…
- Some basic conditions that he thinks an adequate account of confirmation should meet:

  EC (entailment condition): if $E \vDash H$, then E confirms H.

  SCC (special consequence condition): if E confirms H_1 and $H_1 \vDash H_2$, then E confirms H_2.

  EQC (equivalence condition): if H_1 and H_2 are logically equivalent, then E confirms H_1 iff E confirms H_2.
- He also considered but rejected:

  CCC (converse consequence condition): if E confirms H_1 and $H_2 \vDash H_1$, then E confirms H_2.

2. Confirmation theory: non-Bayesian approaches

- Why so? Because, when conjoined with some of the previous desiderata, it entails

  Absurdity #1: E confirms H for *any* E and H!
- *Proof*:

  (i) For any E, $E \vDash E$. (logical truth)

  (ii) For any E, E confirms E (from (i) and **EC**)

  (iii) For any H and E, $H\&E \vDash E$. (logical truth)

  (iv) For any H and E, E confirms $H\&E$ (from (ii), (iii) and **CCC**)

  (v) For any H and E, $H\&E \vDash H$. (logical truth)

  (vi) For any E and H, E confirms H (from (iv), (v) and **SCC**) ■

2. Confirmation theory: non-Bayesian approaches

- Note: why should it be **CCC** that goes rather than either **SCC** or **EC**?
- After all, **CCC** does seem attractive.
- Le Morvan [1999] argues that rejecting both **SCC** and **EC** to save **CCC** is too high a price to pay: we get one plausible principle for the price of two.
- He also points out that keeping **CCC** and rejecting just **EC** is even worse: one can derive a second ridiculous conclusion, namely

  Absurdity #2: for any E, if E confirms *some* H, then it confirms *any* H!

2. Confirmation theory: non-Bayesian approaches

- *Proof*:

  (i) Assume that E confirms some H.

  (ii) For any H^*, $H\&H^* \vDash H$. (logical truth)

  (iii) For any H^*, E confirms $H\&H^*$ (from (i), (ii) and **CCC**)

  (iv) For any H^*, $H\&H^* \vDash H^*$. (logical truth)

  (v) For any H^*, E confirms H^*. ((iii), (iv) and **SCC**) ■
- Finally, Le Morvan argues that keeping **CCC** and rejecting just **SCC** isn't any better:

  It turns out that the silly conclusion that, for any E and any H, E confirms H can be derived from just **EC** and **CCC** alone**.**

2. Confirmation theory: non-Bayesian approaches

- *Proof*:
  - (i) For any E and any tautologous H^*, $E \vDash H^*$ (logical truth).
  - (ii) For any H and any tautologous H^*, $H \vDash H^*$ (logical truth).
  - (iii) For any E and any tautologous H^*, E confirms H^* (from (i) and **EC**)
  - (iv) For any E and any H, E confirms H. (from (ii), (iii) and **CCC**) ■
- Now of course, one might want to block this, by retreating to:
  - **EC***: if $E \vDash H$ and H isn't a tautology, then E confirms H.
- Moretti [2003], however, provides a trivial proof of (iv) using just **EC*** and **CCC**.

2. Confirmation theory: non-Bayesian approaches

- So, **CCC**, it seems, must go.
- Note that, on the HD account, confirmation:
  - violates **EC**: it doesn't follow from $E \vDash H$ that $H \vDash E$.
  - violates **SCC**: it doesn't follow from $H_1 \vDash E$ and $H_1 \vDash H_2$, that $H_2 \vDash E$.
  - satisfies **CCC**: if E confirms H_1, then $H_1 \vDash E$. and if, in addition, $H_2 \vDash H_1$, then $H_2 \vDash E$ and hence E confirms H_2.
  - satisfies **EQC**: if H_1 and H_2 are logically equivalent, then if $H_1 \vDash E$, then $H_2 \vDash E$.

  (no problem here wrt the two absurdities just discussed: **CCC** is kept and *both* **EC** and **SCC** are ditched)

2. Confirmation theory: non-Bayesian approaches

- Hempel offers an account that turns out to satisfy **EC**, **SCC** and **EQC** but not **CCC**.
- It is based on the following suggestion: hypotheses are confirmed by their *positive instances*.
- More on this next time…

Reference

- Bradley, R. [2005]: 'Radical probabilism and mental kinematics.' *Philosophy of Science* 72: 342-364.
- Grimes, T. R. [1990]: 'Truth, Content, and the Hypothetico-Deductive Method', *Philosophy of Science* 57: 514-522.
- Hempel, C.G. [1945]: 'Studies in the logic of confirmation', *Mind* 54: 1-26, 97-121.
- Lange, M. [2000]: 'Is Jeffrey Conditionalization Defective by Virtue of Being Non-Commutative?' *Synthese* 123: 393-403.
- Le Morvan, P. [1999]: 'The Converse Consequence Condition and Hempelian Qualitative Confirmation', *Philosophy of Science* 66: 448-454.

Reference

- Moretti, L. [2003]: ‘Why the Converse Consequence Condition Cannot be Accepted’, *Analysis* 63(4).

Next lecture: ‘Confirmation (ctd.)’

- No set reading, but I’ve found an article that is somewhat easier than the Earman and Salmon piece I set last time:
  - Earman, J. [1992]: *Bayes or Bust*. Camb. Mass.: MIT Press. Pp 63-69.