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# [9] Synchronic DBA's + Joyce's Accuracy-Based Argument



## 0. Outline

1. 'Depragmatised' versions of the DBA
2. Joyce's 'accuracy-based' argument



## 1. 'Depragmatised' versions of the DBA

- Christensen [1996, 2004] offers a version of the DBA which he believes avoids the alleged pitfalls of the prudential and inconsistent preference versions: the 'depragmatised' DBA.
- The idea:
  - Previous versions of the DBA fail because they require positing metaphysical or causal connections between graded belief and valuation / behavioural dispositions.
  - Let's rerun the argument positing some other, less problematic relation.
- Here is the argument, minus some bells & whistles (there is a relativisation to 'simple agents' that I won't discuss here)…



## 1. 'Depragmatised' versions of the DBA

- It goes like this:

  (i) **Sanctioning**: $\text{Bel}_S(P) = q$ 'sanctions as fair' bets of the form <*P*, *q*, *S*>.

  According to Christensen: 'sanctions as fair' = 'provides justification' for *S*'s accepting the bet, partly makes the choice of accepting the bet 'a reasonable one'.

  As he points out: the connection between graded belief and valuation/behavioural dispositions here is 'neither causal nor definitional; it is purely normative'.

  (ii) **Bet defectiveness**: 'a set of bets that is guaranteed to leave [*S*] momentarily worse off is rationally defective'.

## 1. 'Depragmatised' versions of the DBA

(iii) **Belief defectiveness**: 'if [*S*'s] beliefs sanction as fair each of a set of bets, and that set of bets is rationally defective, then [*S*'s] beliefs are rationally defective'.

(iv) **Dutch book theorem**: 'if [*S*'s] degrees of belief violate the probability axioms, then there is a set of monetary bets, at odds matching those degrees of belief, that will logically guarantee the agent's monetary loss'.

∴ (v) **Probabilism**: 'If [*S*'s] degrees of belief violate the probability axioms, they are rationally defective'.

- *Objection (1)* (disclaimer: this is half-baked!): ¬(i) ∨ ¬(iii)
  - Consider: 'a set of beliefs *D* that is guaranteed to leave [*S*] believing something false (e.g. some set of contradictory mathematical statements) is rationally defective'.



## 1. 'Depragmatised' versions of the DBA

- Now (depending on one's views) either there can be some belief or set of beliefs *B* that justifies holding *D* or there cannot.
- If there can, it isn't clear that we should claim that *B* is ipso facto rationally defective. E.g.:
  - Say Alan Weir tells me that uncountable additivity is undefinable (*D*) (and say that u.a. *isn't* undefinable)
  - Say I am justified in believing it is true on the basis of my belief that he said so (*B*) (I actually find this plausible).
  - It surely doesn't *follow* that there is something rationally defective in my holding *B*.
- Returning to the DBA,…



## 1. 'Depragmatised' versions of the DBA

- Either $\text{Bel}_S(P) = q$ can sanction as fair each of a set of pragmatically defective bets or it cannot:
  - If it can, (iii) **Belief defectiveness** is false.
  - If it cannot, (i) **Sanctioning** is false.
- *Objection (2)*:
  - On Christensen's view, like the previous ones, the irrationality involved in probabilistic incoherence *isn't epistemic*, i.e. connected with the goal of acquiring true beliefs and avoiding false ones.
  - But intuitively that *is* what the irrationality involved amounts to.



## 1. 'Depragmatised' versions of the DBA

- Christensen approvingly cites Ramsey, who takes probabilistic coherence of graded belief to be some kind of analogue of logical consistency of full belief.
- Probability theory is, according to Ramsey:

  'an extension to partial beliefs of logic, the logic of consistency' (Ramsey [1931], cited in Christensen [2004])
- Popular view: the requirement of logical consistency of 'full' belief is tied to satisfying our epistemic goals of believing the truth and nothing but the truth.
- On this view, what is irrational about simultaneously believing *P* and ¬*P* is that this kind of inconsistency *guarantees that our epistemic goal cannot be achieved*.

## 1. 'Depragmatised' versions of the DBA

- If *this* is the rationale behind logical consistency requirements on full beliefs, it is hard to see how Christensen's DBA makes probabilistic coherence requirements on graded beliefs an extension of these.
- Note: of course, this 'epistemic' view of the rationale for logical consistency could be mistaken (!).
- This completes my overview of the DBA. There is much more to be said but we need to move on…



## 2. Joyce's 'accuracy-based' argument

- Due to time considerations, I'll only give you a *very* brief overview here (more on this during the seminar perhaps).
- Joyce [1998, ms] sets out to provide what Christensen didn't: a purely epistemic vindication of probabilism, i.e. a vindication appealing to a goal of accurately representing the world.
- Starting point:

  the epistemically ideal situation (call it 'zero-inaccuracy') involves having maximally strong degrees of belief in truths and minimally strong degrees of belief in falsehoods (note: here we assume that d.o.b.s are *bounded*).
- Next stop: providing a (-n at least partial) characterisation of a sensible measure of a belief function's departure from zero-inaccuracy in any given world (an *inaccuracy function*).



## 2. Joyce's 'accuracy-based' argument

- Notation:
  - $w$: possible world. $\Omega$: set of all possible worlds.
  - *Bel*: belief function, assumed to be a function from a finite field of subsets of $\Omega$ to [0, 1]. *B*: set of all belief functions.
  - $\mathcal{F}$: the finite field of $n$ propositions over which *Bel* is defined.
  - *T*: 'truth value' function mapping pairs of propositions and worlds onto {0, 1}, such that
    - $T(P, w) = 1$ if $P$ is true at $w$ (i.e. $w \in P$)
    - $T(P, w) = 0$ if $P$ is false at $w$ (i.e. $w \notin P$)
  - Note: the choice of 0 and 1 for the max./min, values of *Bel* and *T* is presumably taken to be conventional here.



## 2. Joyce's 'accuracy-based' argument

- An inaccuracy function, then, is a function *I* that maps ordered <belief function, world> pairs (i.e. members of $B \times \Omega$) onto the reals.
- Joyce assumes that:
  - *I* is a continuous function
  - $I(Bel, w) \geq 0$, with $I(Bel, w) = 0$ iff $Bel(P) = T(P, w)$ (i.e. iff $Bel(P) = 1$ if $P$ is true and $Bel(P) = 0$ if $P$ is false, i.e. iff $S$ has maximally strong degrees of belief in truths and minimally strong degrees of belief in falsehoods ).
- Example: the 'Brier score' is one popular choice that fits the bill.

$$Brier(Bel, w) = \sum_i \frac{[Bel(P_i) - T(P_i, w)]^2}{n}$$

## 2. Joyce's 'accuracy-based' argument

- Joyce argues that, on top of the aforementioned assumptions, $I$ (not me, the function) must satisfy a number of properties; call this set of properties $D$ (here I follow Joyce [ms]).
- These hold for all $w, w^* \in \Omega$, $Bel, Bel^* \in B$ and $P, Q \in \mathcal{F}$.
- The first one is:

  **Dominance**: if $Bel(P) = Bel^*(P)$ for all $P \neq Q$, then $I(Bel,w) > I(Bel^*,w)$ iff $|T(Q, w) - Bel(Q)| > |T(Q, w) - Bel^*(Q)|$.

  What this means: other things being equal, one belief function is more inaccurate than another iff the value that the first belief function assigns to a proposition is further from the value assigned by the truth function than is the value assigned to that proposition by the second belief function.



## 2. Joyce's 'accuracy-based' argument

- The second one is:

  **Normality**: if $|T(P, w) - Bel(P)| = |T(P, w^*) - Bel^*(P)|$ then $I(Bel,w) = I(Bel^*,w^*)$.

  A consequence of this: overestimation by $x$ is penalised as much as underestimation by $x$.
- These two first principles are pretty uncontroversial...



## Reference


- Christensen, D. [1991]: 'Clever Bookies and Coherent Beliefs', *The Philosophical Review* 100(2): 229-247.
- Christensen, D. [2004]: *Putting Logic in its Place*. Oxford: OUP.
- Joyce, J. [1998]: 'A Nonpragmatic Vindication of Probabilism', *Philosophy of Science* 65(4): 575-603.
- Joyce, J. [ms]: 'The Accuracy of Partial Beliefs I & II', available at socrates.berkeley.edu/~fitelson/few/few_04/joyce.pdf
- Ramsey F. [1931]: 'Truth and Probability', in his *The Foundations of Mathematics*. London: Routledge.




## Next lecture: 'Indifference'

- Reading:
  - van Fraassen, B. [1989]: *Laws and Symmetry*. Oxford: OUP. Ch 12 'Indifference: The Symmetries of Probability'.