McGrew FEW 2006, part I

Introduction to joint session: Bayesian probability theory and foundationalist epistemology are not usually thought of as natural allies. But we intend to argue that foundationalism, contra Richard Jeffrey, is good for Bayesianism and that Bayesianism is good for foundationalism. Each helps the other to answer a criticism that has been advanced against it. I will argue that foundationalism is good for Bayesianism in Part I of the session, and Tim will argue that Bayesianism is good for foundationalism in Part II.

Lead-in to part I: Jeffrey on kinematics and dynamics. Jeffrey Conditioning is intended to be kinematic rather than dynamic, and indeed is called "probability kinematics." But Jeffrey himself clearly thought that it had dynamic relevance, specifically, that its legitimacy counted as an argument against strong foundationalism a la C. I. Lewis.

I. Problem: How do you know when the posteriors--P (H|E), P (H|-E)--are rigid as required for JC?

A. The problem as stated by Judea Pearl.
B. The problem as pressed by I. Levi--Here it has a normative twist: How do you justify the required rigidity, together with the change in the probability of E, as rational rather than merely caused?
C. The problem in its practical form as put forward by Mary Hesse: Conditioning of any sort is only scientifically useful if we can get a grip ahead of time on what will happen to our probability distribution under some new evidential conditions, but radical personalism seems to make this impossible.
D. Elaboration of normative version of the problem and relation to foundationalism. The normative problem and, indirectly, the practical problem, arise from the attempt to use JC as a way of doing away with strong foundations.

II. Solution to the problem found in foundationalist model.

A. Pearl's version of solution based on screening off and the introduction of certain evidence.
B. My version, similar to Pearl's but with different emphases. (Handout below) Under the conditions as stated, screening off is both a necessary and a sufficient condition for rigidity of posteriors.

III. Epistemic relevance of the solution--The strong foundationalist has a complete, non-arbitrary condition for the applicability of JC. A moderate foundationalist or a personalist does not have this. A strong foundationalist holds that all differences in rational credibilities arise ultimately from differences in the foundations. A change from one rational probability distribution to a different one thus must be occasioned by a change in the foundations, though this change may manifest itself by way of its impact upon various intermediate premises.

IV. Two objections and replies.
A. Accessibility

1. Why should the screening-off condition be any more accessible than the rigidity condition itself?

2. Psychologically, it may well be easier to access rigidity if we can get at a reason underlying it. But epistemologically, it is rationally preferable to have a reason for rigidity in any event, whether the SO condition is more easily accessible or not.

B. The fate of Jeffrey Conditioning in a foundationalist epistemology

1. Doesn't the reintroduction of strong foundations make JC irrelevant, as Jeffrey seemed to assume? And isn't that an argument against their reintroduction, since JC does seem so useful?

2. No, it does not, because epistemic routing is real.

a. Brief description of epistemic routing and of Jeffrey's early misquotation of C.I. Lewis. Jeffrey's early use of Lewis implied that foundationalists take all non-foundational propositions to be based *directly* on the foundations. Jeffrey even implied that the search for foundations arises from an inability to "see how uncertain evidence can be used." (Later, he seemed to realize that this was not a correct representation of foundationalism, though he never appeared to notice the actual misquotation, but he still considered JC to be necessary since certain foundations are unavailable.)

b. Relation of epistemic routing to the continued relevance of JC in analyzing epistemic structure. Since uncertain beliefs are often not based directly on the foundations, JC is important in showing us the fine structure of a rational cognitive corpus; it allows us to see how shifts in the foundations make a difference to the probabilities of intermediate premises and thereby to other inferred beliefs.

Transition to Part II: The fact that epistemic routing is real has many ramifications. The existence of premises that act as channels of epistemic force from foundational premises shows the continued relevance in foundationalist epistemology of shifts in the probability of uncertain evidence. But it also allows foundationalists to answer a criticism that has been leveled against their theory by advocates of various non-foundational structures, such as coherentism and foundherentism--the criticism that foundational models are unable to cope with cases of mutual positive relevance.

McGrew FEW 2006, part II

I. The "mutual support" objection against pure foundationalism

A. The objection stated

1. Sources (Haack, *Evidence and Inquiry*; Post, "*Sic* Transitivity")
2. Diagrammatic representation (Diagram 1): arrows going from H_1 to H_2 and *vice versa*
3. Analogy to Lewis Carroll's "Pillow Problem" regarding the walking stick

B. Earlier approach and its inadequacy (T. McGrew, "How Foundationalists do Crossword Puzzles," *Phil Studies* 96 (1999): 333-50)

1. Diachronic approach left the synchronic question unanswered
2. Blurred the distinction between conditional and unconditional credibilities; this prevented the key idea from being a resolution of the problem on pain of a violation of the objectivity constraint on rational belief, i.e.:

   Disagreements regarding the probability of any proposition are due either to differences in the relevant evidence available to the disagreeing parties or to specific inferential failures on the part of at least one of the disputants.

   Since we take the objectivity constraint to be epistemically non-negotiable, the objection requires a different solution.

C. Response to the objection

1. A Jeffrey shift originating in rigid conditional probabilities can give us a two-stage model that respects the objectivity constraint. [The following discussion can be followed easily by considering the Bayes Net in the Netica Diagram.] Suppose that H_1 screens off f_A from H_2 and that H_2 screens off f_B from H_1. Consider the following valuations (rounded at 3 figures) which are consistent with these assumptions:

   Let $P(H_1|H_2) = .706$
   Let $P(H_1|{\sim}H_2) = .375$

   Let $P(H_2|f_2) = .68$
   Let $P(H_2|{\sim}f_2) = .5$

   Let $P(f_A|H_1) = .9$
   Let $P(f_A|{\sim}H_1) = .25$

   Let $P(f_B|H_2) = .9$
   Let $P(f_B|{\sim}H_2) = .25$

   Now it follows that $P(H_1|f_1 \;\&\; f_2) = .6$ while $P(H_2|f_1 \;\&\; f_2) = .68$. Bringing in first

f_A and then f_B we get $P(H_1|f_1 \& f_2 \& f_A) = .844$, $P(H_2|f_1 \& f_2 \& f_A) = .753$, and then $P(H_1|f_1 \& f_2 \& f_A \& f_B) = .879$ and $P(H_1|f_1 \& f_2 \& f_A \& f_B) = .917$. If we reverse the order in which we introduce f_A and f_B, the intermediate step looks different: $P(H_1|f_1 \& f_2 \& f_B) = .668$, $P(H_2|f_1 \& f_2 \& f_B) = .884$. But in the second step we once again get $P(H_1|f_1 \& f_2 \& f_A \& f_B) = .879$ and $P(H_1|f_1 \& f_2 \& f_A \& f_B) = .917$.

(Note that the Bayes Net models a situation where the temporal ordering of the data is not pertinent to the probabilities involved. This assumption allows us to use the net to show that the model does not violate the objectivity constraint.)

In what sense is either of these a Jeffrey shift? Due to the screening off conditions holding, a change in H_1 from one intermediate value to another is propagated to H_2 via a Jeffrey shift, and *vice versa*. The *ultimate* source of the change in the probabilities is the acquisition of foundational information, but in the intermediate propositions we still need Jeffrey conditioning to show how probabilities can coherently be redistributed.

So we can show, by means of two different diachronic paths to a single final coherent distribution, how each of the propositions H_1 and H_2 can channel epistemic support to the other without any incoherence, circularity, or violation of the objectivity constraint. This solves the problem of mutual support.

2. Diagrammatic representation (Diagram 2): color-coded arrows, where there is nowhere a cyclical path of the same color. This permits a visual representation not only of the positive correlation of H_1 and H_2, which is of course a symmetric relation and gives us the "mutual" in mutual support, but also of the channeling of epistemic support from more fundamental premises through H_1 to H_2 and *vice versa*, without circularity.

3. Probabilistically coherent representation: a Bayes Net (Netica Diagram) illustrates the coherence of this conception: unidirectional *support* (the net is acyclical) is compatible with mutual channeling of support. It also gives a dynamic illustration of the meaning of the arrows in Diagram 2.

II. The basing relation

What does all of this tell us about the basing relation?

A. Simplistic notion of basing leads to the conclusion that cases of mutual support require us to allow a proposition to be based on itself. (If A is based on B and B is based on A, then A must be based on A.)

B. More sophisticated notion of basing includes both basing directly on the foundational beliefs (which have their probabilities of 1 intrinsically) and basing on intermediate premises as conduits of foundational evidential force.

Neither $P(H_1)$ alone nor the TTP computation of $P(H_1)$ in terms of a partition $\{H_2, \sim H_2\}$ gives us any insight into the role H_2 plays with respect to H_1 in one's cognitive economy: in particular, those factors alone do not suffice to indicate the manner in which H_2 connects other, and ultimately foundational, evidence to H_1, or even how H_2 acts as a *premise* for H_1.

All non-foundational premises are conduits in this sense.

C. Transitivity

1. Transitivity of basing must be disallowed when transitivity would result in loops (basing is acyclic). In terms of the color-coding in Diagram 2, no colored path can contain a loop.

   Probabilistic incoherence would be induced by violating this constraint. By the Theorem on Total Probability, we know that $P(H_1) = P(H_2)\, P(H_1|H_2) + P(\sim H_2)\, P(H_1|\sim H_2)$, but this requires that $P(H_2)$ be in the relevant sense independent of $P(H_1)$. Otherwise we could reverse the TTP, expressing $P(H_2)$ in terms of $\forall H_1$, then use the new value of $P(H_2)$ for the same procedure, and ratchet up both probabilities *ad infinitum*.

2. Acyclic basing combined with screening off is transitive within a given line of support. In fact, the notion of a conduit of evidential force requires this: H_1 is based on H_2 which in turn is based (*inter alia*) on f_B. H_1 is based on f_B. H_2 is a conduit of the force of f_B to H_1. H_2 is based on H_1 which in turn is based on f_A. H_2 is, as a consequence, based on f_A. H_1 is a conduit of the force of f_A to H_2. But neither H_1 nor H_2 is based on itself.

   The terminology here is somewhat slippery. Normally, to say that a binary relation R is transitive is simply to say that from Rab and Rbc it follows that Rac. What we are really looking at here is something slightly different: when $\forall$Y screens off X from Z, and the inequalities $P(Y|X) > P(Y)$ and $P(Z|Y) > P(Z)$ both hold, then $P(Z|X) > P(Z)$. (Shogenji, 2003). Shogenji calls this "probabilistic support [that is] transitive provided" that the screening condition is met. There seems to be no better or clearer terminology available.