The Pragmatics of Explanation I

- Van Fraassen (see his 1980 book *The Scientific Image*) developed a sophisticated pragmatic theory of explanation.
- The motivation behind Van Fraassen's pragmatic account involves thinking of explanations as answers to why-questions. Examples:
  1. Why did ***Adam*** eat the apple?
  2. Why did Adam ***eat*** the apple?
  3. Why did Adam eat ***the apple***?
- These are really three *different* why-*questions* — although they all stem from the same interrogative why-*sentence*.
- Presumably, (1) is looking for an explanation which tells us why it was *Adam* (and not someone else) who ate the apple, (2) is is looking for an explanation which tells us why Adam *ate* (as opposed to doing something else to) the apple, and (3) wants to know why Adam ate *the apple* (as opposed to Adam eating something other thing).

The Pragmatics of Explanation II

- This simple example nicely illustrates several central features of Van Fraassen's theory.
- First, we notice that each why-question makes certain a *presupposition*. This presupposition is that *the explanandum is true*.
- In (1)–(3), the presupposition is that Adam ate the apple. This is the explanandum in each case. So, what is *different* between (1)–(3)?
- The difference between (1)–(3) is a difference in *contrast class*. In (1) the contrast class would consist in *other people* having eaten the apple. In (2), it would be Adam doing *other things* to the apple, and in (3), it would be Adam eating something *other than* the apple.
- Intuitively, answers which are appropriate for (1) may not be appropriate for (2) or (3). For instance, depending on the context, it might be somewhat odd to answer (2) by saying "Because Eve wasn't hungry." But, in the same context, this might be a good answer to (1).

The Pragmatics of Explanation III

- The contrast class for (1) might be {Adam ate the apple, Eve ate the apple, the serpent ate the apple, the goat ate the apple}.
- The contrast class for (2) might be {Adam ate the apple, Adam threw the apple away, Adam fed the apple to the goat}.
- The contrast class for (3) might be {Adam ate the apple, Adam ate the pear, Adam ate the pomegranate}.
- It should be now be clear that more than just the explanandum is presupposed in a (fully-fleshed-out) why-question. It is also presupposed that *only one member of the contrast class can be true*.
- Presumably, it is also presupposed that there is *some answer* to the why question. That is, it is presupposed that there is some true proposition that would count as an answer to the why-question.
- Let $X = \{P_1, P_2, \ldots, P_k, \ldots\}$ be the contrast class of the why-question, and let P_k be the *explanandum* or the *topic of the why-question*.

The Pragmatics of Explanation IV

- The presupposition of a why-question Q (in context K) is given by:
  (a) P_k (the *explanandum*) is true.
  (b) P_j is false, for $j \neq k$.
  (c) There is at least one true proposition A which would count as an answer to Q, relative to contrast class X, in context K.
- Van Fraassen states (c) slightly differently. He puts (c) in terms of A's being "relevant" (bearing a "relevance relation" R) to $\langle P_k, X \rangle$. I prefer not to do it this way (for reasons which will become clear later on).
- Also, Van Fraassen does not explicitly build the context K into his formal account (this is also a mistake, I think, as we'll see...).
- Now, a *direct answer* to Q will be of the form:
  (*) P_k in contrast to the rest of X (in K) because A.
- Here, A is called the *core of an answer* to the why-question Q.

The Pragmatics of Explanation V

- Now, the following conditions must be met if (*) is to qualify as a direct answer to Q (with implicit contrast class X, and in context K).

  (i) A is true.

  (ii) P_k is true.

  (iii) No member of X other than P_k is true.

  (iv) A counts as an answer to Q, rel. to contrast class X, in context K.

- This may sound circular, but I think something interesting can be said about (iv) to give it a more precise and non-circular character.
- Van Fraassen avoids sounding circular by stating (iv) in terms of A's being "relevant" to $\langle P_k, X\rangle$, but he ends-up with a somewhat trivial-sounding account, as will be seen below in examples of Salmon.
- We need to say something more about (iv) here. First, let's discuss Salmon's "triviality" criticism of Van Fraassen's account.

The Pragmatics of Explanation VI

- Van Fraassen states (iv) as follows:

(iv*) A bears relation R to $\langle P_k, X\rangle$.

- Here, R is supposed to be a "relevance relation." The idea is that the answer A should be "relevant" to P_k relative to X.
- Van Fraassen does not say much about what R should be. He suggests that it is "determined by the context" in which the question is asked. And, he says that "scientific" explanations are just going to be ones which emanate from (or are evaluated using) "scientific" theories.
- Salmon and Kitcher argue that — according to VF — virtually anything can count as an answer to just about any why-question, because VF does not place constraints on the "relevance relation" R.
- Next, I will examine the example of Salmon and Kitcher. Then, I will try to more charitably reconstruct VF's pragmatic theory.

The Pragmatics of Explanation VII

- Salmon & Kitcher give the following example: P_k = JFK died 11/22/1963. X = {JFK died 1/1/63, JFK died 1/2/63, ..., JFK died after 12/31/63}. $xRy = y$ is predicted by astrology, on the basis of x.
- Then, consider the following answer to "Why did JFK die 11/22/63."

  (*) P_k in contrast to the rest of X because A.

  where A is a true description of the configurations of the planets, sun, moon, and stars at the time of JFK's birth [so A bears R to $\langle P_k, X\rangle$].
- It appears that (*) satisfies all of VF's requirements for a direct answer to a why-question. After all, A is "astrologically relevant" to $\langle P_k, X\rangle$.
- There are two questions we must ask at this point.
  - Must VF say that (*) is an answer to Q?
  - Must VF say that (*) is a "good" (or "scientific") answer to Q?
- I think the answers to these questions are "yes" and "no" ...

The Pragmatics of Explanation VIII

- VF gives an account of what it means for A to be a *good* answer to Q:
  - Is A probable, relative to our background knowledge (in K)?
  - Does A favor P_k over the other members P_j of X (in K)?
  - How does A compare with other competing answers (in K)?
    - Are any other answers more probable than A (in K)?
    - Do any other answers more strongly favor P_k over P_j (in K)?
    - Do any other answers render A *irrelevant* to P_k *vs.* P_j (in K)?
- As I read VF, he's saying that A will be a good (and best) answer (in K), as compared to a set of alternative answers $\{A_i\}$, provided that:
  (1) $\Pr(A \mid K)$ is high, and $\Pr(A \mid K) \geq \Pr(A_i \mid K)$ for all i,
  (2) $f(P_k, P_j, A \mid K) \geq 0$, for all j, and $f(P_k, P_j, A \mid K) > 0$ for some j,
  (3) $f(P_k, P_j, A \mid K) \geq f(P_k, P_j, A_i \mid K)$, for all i, j,
  (4) $f(P_k, P_j, A \mid A_i \,\&\, K) \neq 0$, for all i, j.
- $f(P_k, P_j, A \mid K)$ is the degree to which A favors P_k over P_j, given K.

The Pragmatics of Explanation IX

- VF does not endorse a *particular* probabilistic relevance measure $f(P_k, P_j, A \mid K)$ of the degree to which A favors P_k over P_j, given K. But, I would suggest a likelihood-ratio based measure here:

$$f(P_k, P_j, A \mid K) = \frac{\Pr(P_k \mid A \,\&\, K)}{\Pr(P_k \mid A \,\&\, K)} - \frac{\Pr(P_j \mid A \,\&\, K)}{\Pr(P_j \mid A \,\&\, K)}$$

- Salmon and Kitcher *claim* that all four evaluative criteria are met:

> ...since we have excellent astronomical records we have (1.1) practical certainty regarding the celestial configuration (A) at the time of JFK's birth. In the second place, we must suppose (2) that the astrologer can derive from A, by means of astrological theory, that JFK was more likely to die on 11/22 than on any other day of 1963, and also that JFK was more likely to die on 11/22 than to survive 1963. ...Moreover, (1.2) no other "astrologically relevant" answer A_i could be more probable than A. And, finally, (3) no other "astrologically relevant" answer could favor P_k over P_j more strongly than A does, and (4) no other "astrologically relevant" answer A_i could render A irrelevant to P_k *vs.* P_j (presumably, we get (1.2), (3), and (4) from the fact that A is an "astrologically complete" set of "initial conditions").

The Pragmatics of Explanation X

- Before we get to evaluating Salmon and Kitcher's objection to VF's theory, let's re-consider how "progmatic explanation" works.
- It seems to me that there is more that is presupposed in the context of a why-question. It seems to me that the following is also presupposed:

(†) It is *not* the case that $\Pr(P_k \mid K) > \Pr(P_j \mid K)$, for all j.

- What (†) says is that *our background knowledge does not already favor P_k over all other P_j members of the contrast class X* (in K).
- If (†) were violated, then there would be no *need* for an "explanation"!
- Of course, K cannot include the explanandum (since this woukld make $\Pr(P_k \mid K) = 1$). This is the familiar problem about explanations that we saw in previous probabilistic theries of explanation. [Remind you of the "problem of old evidence"? We already know that P_k is true, and we are looking for a "theory" which "explains" or "predicts" P_k. And, we want to *use* P_k to *discriminate* alternative "explanations."]

The Pragmatics of Explanation XI

- Back to Salmon, Kitcher, and VF. Salmon and Kitcher seem to think that no constraints on VF's "relevance relation" are implicit in his theory. This is a bit unfair. It seems to me that plenty of constraints are implicit in the account of a *good* answer to a why question.
- Indeed, (1)–(4) are non-trivial probabilistic constraints on what counts as a "relevant" answer. And, we can see much more clearly how the context K comes into play here. It is the *reference class* for Pr!
- Perhaps Kitcher's point is that since K can vary widely, so can what will count as a "good" or "relevant" answer to a why-question.
- But, is this right? I think a much more charitable and accurate reading of VF is that he is thinking of "explanation" as an *empirical* phenomenon (VF is, after all, an *empiricist* who eschews modality!).
- Exactly how would a charitable, empiricist reading of VF's account go? I think it would be based on the notion of *prediction*...

The Pragmatics of Explanation XII

- If explanation is to have any real value in an *empiricist* philosophy of science, it had better answer to a *predictive* criterion!
- Here's a more charitable reading of VF's on scientific explanation.
- A scientific answer A to a why-question Q is a *prediction* of P_k (*vs.* P_j) made by (or derived from) a scientific theory T, together with background knowledge K (circumscribed by context).
- An answer A to Q is "better than" a collection of alternative answers $\{A_i\}$ if T *better predicts* P_k (*vs.* P_j) than each T_i does, relative to K.
- Thus, the "rules of the explanation game" are just the "rules of the *prediction* (or *confirmation*) game" (just as an *empiricist* would want).
- Now, how does VF handle the Salmon/Kitcher example? Easily. Do Salmon and Kitcher really want to say that the "astrological theory" *predicts* the date of JFK's death? Of course not. All the astrological theory does is *accomodate* a datum which we already know.

The Pragmatics of Explanation XIII

- Bayesianism can be used to show that *prediction* leads to stronger confirmation of a theory than mere *accomodation* does. See Patrick Maher's paper "Prediction, Accommodation, and the Logic of Discovery" [PSA, vol. 1 (1988): 273-285] for an elegant account.
- I think that's all one needs to defend VF's theory from the "astrology" example. In general, this strategy will block examples in which a worse *predictive* account is claimed to be a better "explanation" or "answer".
- One could still object to this account on the grounds that it is too "superficial" or "empirical", and that it cannot get at the "deep" "modal" content of "real" (causal?) *explanations*. Of course, this would just reduce the the age-old debate between realists and empiricists, and would have nothhing in particular to do with *explanation per se*.
- The real issues involve the goals of scientific inquiry. Does science aim for "deeply explanatory" or just predictively accurate theories?