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Salmon on van Fraassen on Explanation

Wesley Salmon has contributed much to the philosophical discussion of scientific explanation, but his treatment of Bas C. van Fraassen's theory of explanation contains uncharacteristically few insights and many unfortunate misunderstandings. Though Salmon acknowledges van Fraassen's theory as "one of the most significant contributions to the discussion of scientific explanation in recent years,"¹ he omits an adequate discussion of the strengths of the theory from both (Philip Kitcher's² and) his critique of van Fraassen and his influential account of the recent history of philosophical inquiry into scientific explanation. Instead, Salmon focuses his comments on some objections based on straightforward misunderstandings of van Fraassen's theory. Nevertheless, some of Salmon's criticisms contain kernels of truth and point the way towards correcting and completing van Fraassen's theory of explanation. The goal of this paper will be to clear up the misconceptions represented in Salmon's critique and suggest some valuable modifications to van Fraassen's theory.

Salmon critiques, first of all, van Fraassen's identification of explanations with answers to why-questions. In this discussion of a topic on which van Fraassen has said very little, Salmon introduces some useful, if obvious, distinctions, as well as other clearly misguided distinctions. He, first, correctly distinguishes the issue of whether all why-questions are requests for explanations from that of whether all explanations are

¹ Salmon (1998a, p. 364).

² I have focused on critiquing Salmon (1989). It should be understood that most of the ideas I will be portraying as Salmon's are present in Salmon and Kitcher (1986) and should be equally credited to Kitcher.

answers to why-questions. He rightly answers “no” to both questions but only incorrectly implies that either of these conclusions constitutes a substantial objection to van Fraassen's account of scientific explanation.

The former question is hardly worth discussing. For the purposes of this paper, we will simply assume that why-questions typically request explanations. This assumption is very reasonable because the word “why” is defined as asking for a cause, reason, or purpose.³ It follows that anything characteristic of why questions is characteristic of a type of explanation request.⁴

However, the latter problem of whether all requests for scientific explanations may be expressed by why-questions is more important for van Fraassen’s account of explanation. If explanation requests may not always be understood as why-questions, it is difficult to argue that van Fraassen’s account of why-questions really addresses the nature of scientific explanation. It would be possible that requests for scientific explanations are really characterized in some way that does not refer to why-questions. In fact, it seems that this is exactly what Salmon wants to argue. On his view why-questions are just one way of expressing *some* requests for scientific explanations, which he characterizes as accounts of causal mechanisms. If that were true, then the conclusions van Fraassen draws about the nature of why-questions, in particular their essential context dependence, might have no implications for the nature of scientific explanation but only increase our linguistic understanding of one way of requesting accounts of underlying causal mechanisms. Let us therefore examine how Salmon argues that not all scientific

³ Appendix A contains a more thorough discussion of Salmon’s comments on this issue and concludes that there is no pertinent sense in which why-questions do not request explanations.

⁴ If, instead, why-questions typically requested non-explanatory info, one could possibly argue that the characteristics of typical why-questions identified by van Fraassen apply only to these requests for

explanations are requested by why-questions and consider what response van Fraassen could make.

Salmon gives examples of how-possibly and how-actually questions that express requests for scientific explanations, and he claims that they cannot be expressed by why-questions. First, let us dismiss his example of a how-actually question. He contrasts “How did there come to be mammals (other than bats) in New Zealand?”⁵ with “Why did mammals come to New Zealand?” a question about the motives of the mammals that is admittedly not equivalent to the how-question. He fails to consider, “Why are there non-flying mammals in New Zealand?” a question which could certainly be understood as asking for an account of how the animals got there. His claim that how-actually questions are distinct from why-questions appears to be based on a simple mistake. However, Salmon does show his example of a how-possibly question to be distinct from any conceivable why-question. He considers the historically real example of an airplane flipping onto its back and crashing shortly after takeoff during a snowstorm in Denver. He knows of two accounts of how it was possible for the plane to flip over, but he does not know whether either account was eventually determined accurate. So, both are good answers to the question, “How was it possible for the plane to flip?” but it is unclear whether either provides a good answer to the question, “Why did the plane flip?” This directly shows that the two questions have different meanings.

Indeed, other writers have argued that requests for scientific explanations take several forms that cannot be expressed as why-questions.⁶ For instance, it is not difficult to argue more convincingly than Salmon that how-actually questions can request

information and not to those supposedly atypical why-questions that request explanations.
⁵ Salmon (1989, p. 138).

explanations that would be unnatural to request with a why-question. Consider, “How does Saturn look through a telescope?” In addition, Sylvain Bromberger lists several typical non-why requests for explanations of an event *E*, including: “To what other events is *E* similar?” “What effects did *E* have?” and “When will anything like *E* happen again?”⁷ The case for why-questions being the archetype of scientific explanation requests looks pretty bleak.

However, it is important to realize that in the context of the philosophical study of scientific explanation, the label “scientific explanation” ordinarily refers to only a certain class of explanations that draw on science. For instance, Salmon, would likely accept that the question, “What effects did *E* have?” requests an explanation in a certain sense, but he shows no sign of acknowledging that the explanation it requests must fit into his account of scientific explanation. He seems to have reserved the phrase “scientific explanation” for a type of scientific explanation that is particularly important for philosophy of science, a type which is probably best characterized as precisely those explanations requested by why-questions. In the conclusion of *Four Decades of Scientific Explanation*, for instance, Salmon contrasts the view prominent at the beginning of the twentieth century that “it is no part of the business of science to provide explanations” with the agreement of current philosophers of science “that science can teach us, not only *that*, but *why*,”⁸ seemingly identifying explanations with answers to why-questions. Moreover, even in the midst of his argument against “the claim that all requests for scientific explanation can be formulated as why-questions,”⁹ Salmon displays his

⁶ e.g. Achinstein (1983) and Bromberger (1986).

⁷ Bromberger (1986, p. 316)

⁸ Salmon (1989, p. 181).

⁹ Salmon (1989, p. 137).

tendency to call only answers to why-questions actual explanations. His intent is to exhibit a how-possibly question as an example of a request for an actual scientific explanation that cannot be formulated as a why-question. However, he admits that “a how-possibly question does not require an *actual* explanation; any *potential* explanation not ruled out by known facts is a suitable answer.”^{10,11} Here, by actual explanation, he means a good answer to the corresponding why-question.

We may conclude that although there are certainly scientific explanation requests other than why-questions, those explanations requested by why-questions are of particular importance. The philosophical analysis of scientific explanation is primarily, if not exclusively, concerned with the nature of the answers science gives to why-questions, and for good reason. Understanding the answers science gives to these controversial questions is crucial for understanding the relationship between science and religion. The nature of this type of scientific explanation is also critical for those interested in defending inference-to-the-best-explanation as a distinct mode of scientific inference. A detailed treatment of these issues is assuredly beyond the scope of this paper, but let us follow Salmon in examining what van Fraassen has to say about scientific explanations requested by why-questions, which we shall hereafter unabashedly refer to, specifically, as scientific explanations.

First, a brief description of van Fraassen's theory of explanation will be helpful. He seeks to determine what counts as an explanation by determining what counts as an answer to a why-question, that is, by establishing exactly what a typical why-question

¹⁰ Salmon (1989, p. 137, emphasis added).

¹¹ Interestingly, this suggests a simple way to understand how-possibly explanations on van Fraassen's account of explanation. How-possibly questions are simply why-questions for which the truth of the information given as an answer is less important.

about a proposition P is asking for. His main point is that there is a lot more to the question "Why P ?" than there appears. Van Fraassen explains that a why-question is only fully specified when its contrast class X and relevance relation R are determined in addition to P , its topic. The contrast class includes P and alternatives to P such that the question really asks for an explanation of why P *rather than* those alternatives.

(Notationally, the topic of the question is labelled P_k instead of P to indicate that it is a member of the contrast class $X = \{P_1, P_2, P_3, \dots\}$.) The relevance relation specifies what sort of answer the why-question requests. Van Fraassen's claim, then, is that every why-question has a contrast class and relevance relation, whether specified explicitly in the statement of the question or not. He argues that it would be a mistake to consider "Why P ?" as a fully specified why-question and attempt to delineate what counts as an acceptable answer without inquiring into the contrast class and relevance relation that complete the meaning of the question. It is worth noting from the start that Salmon makes this mistake repeatedly. He fails to recognize that on van Fraassen's account, a questioner typically intends a certain contrast class and relevance relation as a part of her question without specifying them explicitly if they are evident from the context of her question.

Salmon begins his critique of this theory of explanation by considering the example question, "Why did John F. Kennedy die on 22 November, 1963?"¹² Here, the topic P_k is "JFK died on 22-11-63." The contrast class and relevance relation are not indicated in the statement of the question, so Salmon specifies them. The contrast class X is {"JFK died on 1-1-63," "JFK died on 2-1-63," ..., "JFK died on 22-11-63," ..., "JFK died on 31-12-63," "JFK survived 1963"}, and the relevance relation R is "astral influence." To help our understanding of the situation, let us consider an actual context in

which this question might be asked. Imagine an admirer of both JFK and astrology dialing the number of an astrologer advertised on television and asking, "Why did John F. Kennedy die on November 22, 1963?" He is interested in knowing why JFK died on that particular date, but he assumes that JFK probably wouldn't have died before 1963 and that if JFK had survived 1963, he probably would have died of natural causes, making the date of his death less interesting. Hence the contrast class specified above.¹³ Clearly, the questioner is asking for an explanation in terms of astral influence. An historical explanation in terms of the book depository or grassy knoll would not be relevant in this context. Finally, note that the background information K consists of both accurate astronomical information about the astral configuration at the time of JFK's birth and the astrologer's astrological theory.

For Salmon, the punchline is that, in the above context, van Fraassen's theory of explanation counts the the astrologer's answer—describing the configuration of the stars at the time of JFK's birth that, according to his theory, favors JFK's death on 22-11-63 over the other members of the contrast class— as a good explanation. So far, we've seen only that it is a proper answer to the why-question because it affirms P_k , denies the rest of X , and cites a reason consistent with R . Van Fraassen treats the question of whether an answer is a good one as a separate question, somewhat confusedly.¹⁴ He lists three criteria for evaluating a proposed answer. First, how probable is the answer in light of the background knowledge, K ? In our example, the configuration of the stars at the time of

¹² Salmon (1989, p. 141).

¹³ Note that if, at first, the astrologer misunderstands this somewhat arbitrary, implicit contrast class and begins by discussing the astrological reasons why JFK did not die in 1943 when his ship sank, the questioner can interrupt him and specify explicitly the contrast class he is asking with respect to: "Why that date in 1963 and not afterwards?"

¹⁴ cf. Achinstein(1985, p. 280). See Appendix B for a simpler presentation of the evaluation of answers.

JFK's birth is implied by the background knowledge. Second, to what extent does the answer favor the topic over the other members of the contrast class? Here, again, K implies that the cited astral configuration favors P_k . Third, are there better answers? That is: "(i) are any other answers more probable? (ii) do any other answers more strongly favor the topic? (iii) do any other answers render this one wholly or partially irrelevant?"¹⁵ As Salmon points out, the astrologer's answer is superior to any other in this context.¹⁶ Thus, according to van Fraassen, in the specified context, the astrologer's answer is a good explanation of the date of JFK's death.

Salmon proposes this example as a clear sign of what he takes to be a serious problem with van Fraassen's account of explanation, but his judgment of the above example as obviously embarrassing for van Fraassen's theory is a mistake. On the contrary, I find it rather impressive that van Fraassen's theory of explanation functions even in a context in which an exotic theory like astrology is taken as part of the background information. Salmon's own account of explanation in terms of causal mechanisms, in contrast, would fail to acknowledge astrological explanations as scientific explanations *even if astrology were a successful and accepted scientific theory*. However, granting that astrology is not a valid scientific theory, the ability of van Fraassen's theory to identify good explanations in any context, regardless of what is taken as background knowledge is a substantial achievement.¹⁷ His account of explanation provides a clean separation between the questions of whether a theory provides explanations and whether

¹⁵ Salmon (1989, p. 142).

¹⁶ Salmon (1989, p. 143).

¹⁷ The quality of astrological explanations may, thereby, be discussed on their own terms. The questioner in the above example would complain if the astrologer he is paying \$10/min explains only why it was more likely for JFK to die on November 22 without explaining the year or gives his personal conspiracy theory in explanation of JFK's death rather than the astrological explanation requested. Van Fraassen's account of explanation provides a way of understanding why these explanations are bad even in this

it is worthy of acceptance as a scientific theory. Thus, van Fraassen's theory labels the astrological explanation unscientific for the common-sense reason that it is based on an unscientific theory.

Salmon attacks the sufficiency of this unorthodox method of distinguishing scientific explanations in a few instructive ways but is ultimately unsuccessful in discrediting van Fraassen's approach. He, first, points out that if the evaluation of whether an answer favors P_k proceeds with reference to the questioner's personal probabilities, then an astrological answer could favor P_k for a believer in astrology, without requiring astrological theory to be included in K , and thereby count as a good scientific explanation. Since personal probabilities are not determined by the background information accepted by a person, no matter what it is, this objection points to a general problem with using personal probabilities to evaluate explanations. Using the probabilities warranted by K , rather than subjective probabilities, to evaluate answers would eliminate this problem.¹⁸

Yet, even if the astrological explanation considered above were evaluated as a poor one, it would be counted as a proper answer to the question. Salmon points out that, in a context in which astrology is not accepted, the proper response to a request for an astrological explanation is not a poor answer, but the rejection of the question as admitting of no good answers.¹⁹ This is a solid point. I agree that the presuppositions of a why-question should include the existence of a *telling* answer, so that if this

extraordinary context.

¹⁸ See Appendix B for a definition of warranted probabilities and my modified account of the evaluation of answers incorporating warranted probabilities.

¹⁹ Salmon does a very nice job of explaining van Fraassen's account of rejection.

presupposition is not met, the proper response to the question is rejection.^{20,21}

In a last-ditch effort to demonstrate the inability of van Fraassen's theory to exclude astrological explanations from being considered good scientific explanations, Salmon proposes the contrived answer $A = (B.(if B, then P_k).\sim Z)$, where B = the astral configuration at JFK's birth, and Z = the disjunction of all P_i , for $i \neq k$. He stipulates R as "logical deducibility." Then this is a perfect, scientific answer to the question specified by P_k , X , and R because it implies the truth of the topic and the falsehood of the other members of the contrast class without need of background astrological theory.^{22,23}

However, the relevance relation R is specified by the questioner—it is not stipulated by philosophers of ill will. Therefore, if a given questioner wants an answer other than the conjunction of an arbitrary proposition and something logically equivalent to the topic of her question, she need only specify a relevance relation which bars such an answer. This is not difficult to do, for such a property of R is usually assumed implicitly, since a questioner always desires more than the presupposition of her question for the core of an answer. However, she is free to ask a question with a relevance relation that allows the topic of her question to be an answer. I think Salmon and Kitcher said it best: "If we pose silly questions, we should not be surprised to get silly answers."²⁴ People tend not to ask the kind of silly questions that they find so objectionable, to say the least. The issue at

²⁰ See Appendix B for an account of evaluation of answers including this presupposition as an integral part.

²¹ This added presupposition would be enough to block the claim made in Salmon and Kitcher (1986) that "for any pair of true propositions, there is a context in which the first is the (core of the) only explanation of the second" (p. 181), even allowing their blatant misconstrual of the contextually determined nature of R .

²² They claim, further, that B is an "essential part" of this answer. This is only true in a narrow, syntactic sense, however. For A is logically equivalent to $(B. P_k.\sim Z)$, from which B may clearly be removed, leaving a perfect answer in tact. Expressing it as they do appears to be a shameless obfuscation.

²³ By the same reasoning, Salmon and Kitcher "show formally that *any* true proposition [B] can be an indispensable part of an explanation of *any* topic P_k ...and, indeed, that it gets highest marks as an explanation of P_k " (Salmon, 1989, p. 143, emphasis the author's). The same objections apply.

hand is the nature of the explanations science gives to the questions they *do* ask.

However, Salmon draws a different moral from the consideration of silly questions. He proposes adding a requirement to van Fraassen's theory that the relevance relation R be what he calls a genuine relevance relation.²⁵ He sees this amendment as filling a crucial gap left by van Fraassen when he "repeatedly refers to R as a 'relevance relation'" without incorporating a "relevance requirement on R in the formal characterization."²⁶ However, this complaint is based on a fundamental misunderstanding of van Fraassen's theory. R is meant to specify what sort of answer is relevant to the *question*, not what sort of factor is statistically, or otherwise, relevant to the topic of the question. The questioner is thus completely free to specify what sort of information she is requesting. Van Fraassen discusses the issue of whether the information given in an answer is relevant to the topic *in the sense of statistical relevance* as a part of the evaluation of answers, which is completely independent of whether the answer complies with R .²⁷ Let us see how van Fraassen's innovative notion of relevance relation, far from a source of "profound difficulty"²⁸ for his theory, actually enables his theory to successfully account for the examples that Salmon uses to attack his own mistaken version of van Fraassen's theory.

Salmon, first, considers the traditional example of Horace, a bald man who is a

²⁴ Salmon and Kitcher (1986, p. 183).

²⁵ Adding this requirement would bar the relevance relation of astral influence, for instance, and prevent astrological explanations from being called proper or good scientific explanations.

²⁶ Salmon and Kitcher (1986, 181).

²⁷ Since van Fraassen intends R to determine relevance to the question, rather than probabilistic relevance between factors of the sort that is the topic of Salmon's early work on explanation, it may have been helpful for him to refer to R as a "pertinence" or "salience" relation. It seems to me, however, that such words are too weak for the role he intended R to play. "Pertinence" and "salience" indicate exceptional relevance so that some answers that not satisfying a "salience relation" might still be relevant to the question at hand. Instead, van Fraassen is arguing that R is a defining factor for the meaning of a why-question. An answer that does not bear R to the topic and contrast class of the question should not be

member of a school board consisting entirely of bald men. He considers the question that asks why Horace is bald rather than not bald and that specifies, via R, that his baldness should be a first-order derivation of any acceptable answer. No one would ask this question. If they did, the answer, “Horace is a member of the school board,” would indeed be a good answer to that question. To take a more typical example, someone might ask, “Why is Horace bald?” her look of disapproval expressing that she doesn’t think this is a good look for Horace and indicating that she wants information about his motivation for shaving his head. A good answer might be “Well, he didn’t want to be bald, it’s the chemotherapy that has caused him to lose his hair.” This answer corrects the presupposition of the question that a desire of Horace’s to be bald explains his baldness and anticipates a question with a broader range of relevant answers. The answer, “He’s a member of the school board,” would be completely inappropriate because it answers neither the question asked nor any other question likely to be asked.²⁹ Therefore, contrary to Salmon’s attempted criticism, Van Fraassen’s concept of a relevance relation *helps* us to understand why this answer is no good.

Lastly, Salmon critiques van Fraassen’s claim to be able to handle a traditional example of the asymmetry of explanation. He asks if there is a context in which a question with topic, “the height of the tower is h ,” admits “the length of its shadow is l ,” as an answer, if the only other available background information is the angle of elevation of the sun and the linear propagation of the sun’s light. His criticism works by taking this question, “Does such a context exist?” as meaning different things at different points in

considered a possible answer to the question at all.

²⁸ Salmon (1989, p. 141).

²⁹ Of course, if the school board only allows bald members, for some odd reason, this would be a superb answer.

his argument. First, he takes it to mean, “Is such a context formally allowed by van Fraassen’s theory of why-questions?” It takes no particularly clever “trick”³⁰ to show that, yes, such a “context” is formally possible by assuming a degenerate relevance relation of a sort that would probably never be part of an actual why-question. Then he takes his original question to mean, “Does such a context occur in typical human experience?” I will grant that, no, such contexts in which the shadow’s length explains the height of the tower do not typically occur, if the only other background information is the position of the sun. We know “intuitively” that such an explanation would “run the wrong way.”³¹ Of course, van Fraassen’s theory of explanation allows us to understand just what sort of thing this “intuition” consists of. It is simply the knowledge that when someone asks about the height of a tower, they do not typically want an explanation in terms of its shadow.³² On the other hand, people are accustomed to thinking of the length of a shadow as the product of a light source and an obstruction to that light source, and why-questions about the length of a shadow may typically request information specifically about those two things.

Which relevance relations scientists actually do—or, even more intriguingly, ought to—ask with respect to is an interesting question,³³ but it is separate from the aim of van Fraassen’s theory, which is to provide an understanding of how the context determines what constitutes a good explanation. It is also a question that could not be asked so clearly without the benefit of van Fraassen’s powerfully clear theory of

³⁰ Salmon and Kitcher (1986, p. 187).

³¹ Salmon and Kitcher (1986, p. 188).

³² The precise nature of the relevance relation they do most often ask with respect to is open to question and may be difficult to specify exactly. It may have to do with events-leading-up-to the completion of the construction of the tower or motivations for making the tower that height.

³³ See Bromberger (1986) for an approach to this question.

explanation.³⁴ But this is not the only achievement of van Fraassen's theory that Salmon fails to credit in his *Four Decades of Scientific Explanation*.

Salmon neglects an adequate discussion of the concepts of contrast class and favoring, two key components of van Fraassen's theory of explanation that clearly represent significant contributions to the philosophical inquiry into explanation. Salmon does briefly discuss them in a few articles,³⁵ but never attempts to explore their merits. His failure to acknowledge the importance of the contrast class for understanding the paresis example, an example which Salmon otherwise discusses frequently.³⁶ Van Fraassen points out how the concept of contrast class allows us to distinguish between explaining why a syphilis carrier developed paresis in contrast to others that do not carry the disease from explaining why a syphilis carrier developed paresis in contrast to other syphilis carriers, suggesting that we can explain the former though we cannot explain the latter. I can only echo van Fraassen's sentiments that this distinction "is clearly crucial to the paresis example and explains the sense of ambiguity and tension felt in earlier discussion of such examples."³⁷

We have, thus, seen that Salmon's critique of van Fraassen's theory of explanation includes both a few helpful insights and several serious errors. The insights include the suggestions of adding to the presupposition of a why-question the expectation of a *telling* answer and replacing personal probabilities with a different kind in the evaluation of answers. The errors include a misleading analysis of the relationship

³⁴ Contrast the elegance of van Fraassen's account with the bewildering maze of terminology found in Achinstein (1983).

³⁵ e.g. Salmon (1985). In Salmon (1998, pp. 367-8), he muddles the concept of contrast class by trying to combine it with his own related idea of specifying the topic's reference class as part of a why-question.

³⁶ e.g. Salmon (1970, pp. 200-201), Salmon (1984, pp. 51-52), Salmon (1989, p. 49).

³⁷ van Fraassen (1980, p. 128).

between explanations and why-questions, a mistaken understanding of the nature of the relevance relation, and a failure to acknowledge three key achievements of van Fraassen's theory: isolating the evaluation of scientific explanations from the demarcation of science, identifying the importance of the relevance relation, and incorporating the concept of contrast class into a comprehensive theory of explanation. The insights are welcome, but I fear that his errors, which are the result of his refusal to acknowledge that the context has an essential role in determining the quality of a scientific explanation, have obstructed many from appreciating the value of van Fraassen's theory. I hope this paper will help, in some small way, to renew interest in van Fraassen's theory of explanation.

Appendix A: Salmon on Identifying Why-Questions with Explanation-Requests

Salmon claims that some why-questions request information that cannot be characterized as an explanation and that some do not request information at all. As an example of the former, he submits the question "raised in courts of law as to why a member of a minority group was admitted to medical school to the exclusion of some non-minority candidate whose qualifications were somewhat better." Salmon says this question would be best interpreted not as a request for an explanation, but as a request for "moral justification."³⁸ But I cannot see why an account of the moral justification those who decided to admit the student had in mind should not be counted as an explanation of that decision.³⁹ Nevertheless, we may still ask whether there are some why-questions that ask for non-explanatory information. The answer is almost certainly, "No," subject to the distinctions discussed in the following paragraph, because the word "why" is defined as asking for a cause, reason, or purpose.⁴⁰ Why-questions are practically defined as requests for explanations.

For an example of a why-question that does not request information at all, Salmon points to when "one might ask, in a time of grief, why a loved one had died."⁴¹ Such a question may indeed "not [be] intended to evoke an explanation," and expressing sympathy and otherwise silently being-with the person would clearly be a better response than providing information about the underlying physical mechanisms involved in the person's death. However, this attempted counterexample is disposed of with a distinction

³⁸ Salmon (1989, p. 136).

³⁹ The more important issue in a court of law would likely be whether a valid moral justification exists, regardless of what moral justification the decision makers had in mind. The question, "Why *should* the student have been admitted?" would request such an explanation, but Salmon's question does not.

⁴⁰ "why," in *The American Heritage Dictionary of the English Language* (Houghton Mifflin Company, 2000).

⁴¹ Salmon (1989, p. 136).

I learned in an introductory linguistics course. In the context presented by Salmon, we understand that the intention of the grieving one's utterance, what linguists call the *illocution*, is to express grief and request, not information, but sympathy. Yet, the intention evident from the context does not change the literal meaning of the sentence uttered, the *locution*, which is a request for an explanation of (the purpose of) the death. Since there are no limits, independent of a given context, on what the illocution corresponding to a particular locution can be, it is not surprising that, in certain contexts, why-questions can have intended meanings that vary widely from their literal meanings. We must concede that, in a certain sense, not all why-questions are requests for explanation.⁴² But, as Salmon suggests, the context indicates whether a given why-question is a request for explanation or not. And, contrary to Salmon's complaint against van Fraassen for not undertaking the "task" of "distinguish[ing] *explanation-seeking* why-questions from other kinds of why-questions,"⁴³ it is not the philosopher's task to determine whether it is a given speaker's intention to request an explanation with a given why-question. It is up to the speaker (or writer) to make that clear if it is not clear already, and I would be surprised to learn of many situations in which it is unclear whether a certain why-question is asking for an explanation or not.

⁴² Some may even, conceivably, request non-explanatory information.

⁴³ Salmon (1989, p. 136, emphasis author's).

Appendix B: My Revised Version of van Fraassen's Theory of Explanation⁴⁴

“The why-question Q expressed...in a given context will be determined by three factors: The *topic* P_k , the *contrast-class* $X = \{P_1, \dots, P_k, \dots\}$, the *relevance relation* R .”

A direct answer to this question may be expressed in the form: “ P_k in contrast to (the rest of) X because A .” This proposition expresses the claim that P_k is true and the other members of the contrast-class are not true. Secondly, this answer says that A is a true proposition bearing R to $\langle P_k, X \rangle$. Finally, **the word “because” claims that A favors P_k against the other members of the contrast-class.**

According to Belnap's definition of a presupposition of a question, Q , “any proposition which is implied by all direct answers to Q ”(140), “a why question presupposes exactly that

“Using Belnap's general definition [of a presupposition of a question,]⁴⁵ we deduce:

- (a) its topic is true
- (b) in its contrast-class, only its topic is true
- (c) at least one of the propositions that bears its relevance relation to its topic and contrast class, is also true” **and favors its topic against the other members of its contrast-class.**

Evaluating an answer is as simple as evaluating each of its claims. First, is the topic the only true member of the contrast-class? If not, a direct answer is unacceptable; a corrective answer is in order. Second, is A acceptable or likely to be true? To what extent does it bear relation R to $\langle P_k, X \rangle$? Finally, how strongly does A favor P_k against the other members of the contrast-class? (Competing answers should be compared on the basis of

⁴⁴ Quotations are from van Fraassen (1980, pp. 142-149). My changes are shown in bold.

⁴⁵ “A *presupposition* of question Q is any proposition which is implied by all direct answers to Q ”(van

their performance according to the criteria already given. Further criteria articulating a procedure for such comparisons are unnecessary.⁴⁶⁾

The first two criteria are straightforward. The truth or acceptability of the topic, the other members of the contrast class, and the answer are evaluated with respect to the probabilities bestowed on them by K , the information accepted as background. **These probabilities are to be understood as the personal probabilities that K warrants.**

Briefly, K warrants the personal probabilities 1 or 0 for P if K specifies P as either true or false, respectively. K warrants the personal probability p for proposition P exactly if C is the most specific class of which K specifies P as a member and for which K indicates that a certain percentage, p , of the propositions contained in C are known or expected to be true. Otherwise, K warrants a personal probability of 0 for P .

The precise nature of the third criterion for evaluating an answer is less obvious. I propose, first of all, that **A favors P_k with respect to X exactly if there is some subset of the background information $K(A)$ such that A and $K(A)$, taken together, favor P_k (with respect to X) in their redistribution of the probabilities as opposed to $K(A)$ alone.⁴⁷ I will “propose a precise function to measure the extent to which the posterior probability distribution favours [P_k] against its alternatives, as compared to the prior.” Let the *favor-ratio* of P_k with respect to X , for a given probability distribution over X ,⁴⁸ be given by:**

Fraassen, 1980, p. 140).

⁴⁶ In particular, an answer that is “screened off” by another potential answer may be understood as a poor answer if it either fails to favor the topic as strongly as another answer or fails to bear relation R to $\langle P_k, X \rangle$. For instance, in the famous example of barometer readings potentially explaining storms, the why-question under consideration seems to specify an R that bars the barometer answer from consideration.

⁴⁷ This idea is related to J. L. Mackie’s definition of a cause as “an insufficient but necessary part of an unnecessary but sufficient condition.” (114)

⁴⁸ It is assumed that the probabilities of the members of X sum to less than or equal to 1.

$$\frac{p(P_k)^2}{\sum_{i \neq k} p(P_i)^2}$$

Then I propose as a measure of the extent to which A favors P_k the difference⁴⁹ between the favor-ratio of P_k with respect to X , given $K(A)$ and A , and the corresponding favor-ratio given only $K(A)$. Let us call this difference $f(P_k, X, A, K(A))$. If it is positive for some $K(A)$, then A favors P_k with respect to X .⁵⁰

This function captures the spirit of van Fraassen's original discussion of favoring. Further, it accounts for an example that van Fraassen's original formulation of favoring does not include though he speaks of it as if it does.⁵¹ The intuition behind my formula for favoring is that explanation is concerned primarily not with what actually happens, but with what should be expected. The square of the probability of P , that is, the probability that P will occur twice in a row, is a more appropriate measure of the extent to which P should have been expected than the probability of it simply occurring once.⁵² The favor-ratio, then, can be thought of as the ratio of the expectedness of P_k to the combined expectedness of the relevant alternatives. I have found that this account of favoring works for a variety of examples, but further analysis of it is well beyond the scope of this paper.

⁴⁹ It is not clear to me whether it might be better to use the ratio of the two favor-ratios.

⁵⁰ Van Fraassen's proposal for dealing with Simpson's Paradox should be added to this definition of favoring, for completeness.

⁵¹ van Fraassen (1985, p. 642).

⁵² Higher powers than 2 may be even more appropriate, but the square of the probability is simple and appears effective in a variety of examples.

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