

Chapter 15

How Infallible but Corrigible Full Belief Is Possible

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Justifying Changes in Full Belief

Inquirers ought to change beliefs for good reason (Levi 1980 ch. 1, 1991, ch. 1, 2004). What those good reasons are depend on the proximate goals of their inquiries. William James urged us to seek Truth and avoid Error in forming beliefs. He ought to have said: Seek Information and avoid Error. The common features of the proximate goals of scientific inquiries ought to be to answer questions of interest without error and in a manner that yields valuable information.

The beliefs inquirers seek to change are full beliefs. Agent X fully believes that h if and only if X is certain that h is true. That is to say, X rules out the logical possibility that h is false as a serious possibility, takes for granted that h is true and uses this information as evidence in efforts to increase the information available to X. Such evidence constitutes the basis for making assessments of credal probability used to evaluate risky choices.

Justifiably changing judgments of credal probability is important to inquiry only insofar as it contributes to the promotion of the goals of inquiry. One does not engage in inquiry in order to justify changes in credal probabilities. In inquiry new error free information is sought. Credal, belief or subjective probabilities are neither true nor false.¹ Changing credal probabilities neither succeeds in nor fails to avoid error. And changing credal probabilities fails to rule out logical possibilities as serious possibilities. So they do not add to information.

¹As F.P. Ramsey (1990), B. de Finetti (1964) and L.J. Savage (1954) rightly observed.

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The state of credal probability judgment to which X is committed is a function of X's state of full belief or "evidence and background knowledge" and a rule for deriving X's credal probability from X's evidence that I call X's *confirmational commitment* (Levi 1974; 1980). When X's credal state is derivable from X's state of full belief or evidence in accordance with a confirmational commitment, justifying a change in credal state is justifying a change either in X's state of full belief or justifying a change in X's confirmational commitment. As just stated, the proximate aim of a change in X's state of full belief is to avoid importing false belief while acquiring valuable information. Confirmational Commitments, like states of credal probability judgment lack truth values. The proximate aim of modifications of X's confirmational commitment do not involve avoidance of false confirmational commitments or acquiring information by ruling out confirmational commitments as serious possibilities. Changing confirmational commitments is relevant to inquiry aimed at acquiring new and valuable information only insofar as such change facilitate changes in full belief that result in new error free and informative states of full belief.

Philosophical reflection concerning the conditions under which states of credal probability judgment should be modified and how they should be modified is of first rate importance. Credal probability judgment is relevant to the assessment of risks both in practical and theoretical deliberation. But justifying changes in credal probability concerns either the justification of changes in states of full belief or changes in confirmational commitments. Changes in full belief and confirmational commitments alike are justified in terms of how well they promote the acquisition of belief states carrying new, valuable error free information.

Some authors think that in inquiry we seek to change degrees of belief (and disbelief) exhibiting a formal structure similar to Shackle's degrees of belief and surprise (disbelief) (1949; 1961). The goal is to change qualitative beliefs in a sense according to which X believes that *h* if and only if X's degree of belief reaches some suitable nonnegative threshold short of absolute certainty (Cohen 1970, 1977; Spohn 1988).

Degrees of belief in a satisficing sense and belief that *h* equivalent to a high satisficing degree of belief (Levi 1967a, 1997 ch. 2.4, 2002) that has reached a certain threshold are suitable as modes of appraisal in inquiry when the inquirer is considering whether to add an item of information to his or her stock of full beliefs. If the initial state of full belief supports a degree of belief that *h* to a sufficiently high degree relative to the initial state of full belief, the inquirer may be warranted in converting the high degree of belief to a full belief to be added to his or her full beliefs. However, to engage in inquiry or to justify changes in degrees of beliefs or mere beliefs loses its purpose except in a context where the changes in degrees of belief are instrumental to justifying a change in state of full belief.

Change in Doxastic Commitment

Studying changes in states of full belief requires some characterization of the structure of a system of potential states of full belief just as studying changes in the state of a mechanical system requires an understanding of a system of mechanical states. The concern here is, of course, inextricably normative concerned as it is with conditions under which changes from one potential state to another is legitimate and, indeed, justified. Neither classical, statistical nor quantum mechanics is normative in this respect. But the need to consider assumptions about the structure of a “space” of potential states remains the same in the case of changes in states of full belief, changes in classical mechanical states and changes in quantum mechanical states.

In this discussion, the space Ω of potential states of full beliefs is partially ordered by a consequence relation satisfying the conditions of a Boolean algebra. (The algebra is closed under meets and joins of whatever cardinality is required.) Inquirer X is in some state of full belief \mathbf{K} located in this space. While in the state \mathbf{K} , X is committed to full belief that each consequence of \mathbf{K} in the algebra is true. \mathbf{K} is thus a state of doxastic commitment to the truth of the members of the set of its consequences.

It is also a commitment to a standard for distinguishing the potential states in the algebra that are serious possibilities from those that are not. Because I doubt that there is an algebra that represents all potential states of full belief, I rest content with atomic algebras so that we may postulate a set \mathbf{W} of atoms and every potential state in the algebra is the join of a subset of \mathbf{W} . The state of full belief \mathbf{K} then distinguishes between the set $\mathbf{P}_{\mathbf{K}}$ of atoms that are serious possibilities according to \mathbf{K} (which are all atoms that are consequences of \mathbf{K}) and the impossibilities that are ruled out by \mathbf{K} .

Insofar as a potential state \mathbf{H} in Ω is representable by a set of sentences S in a regimented language L where the logical consequence relation in L preserves the consequence relation for Ω , \mathbf{H} is also representable by the set $Cn(S)$ of sentences in L closed under the consequence relation for L . \mathbf{W} is representable by a set W of maximally consistent sets of sentences in L and $\mathbf{P}_{\mathbf{K}}$ by the set $P_{\mathbf{K}}$ of maximally consistent extensions of \mathbf{K} .

Thus, if we focus in inquiry on justifying changes in states of full belief we restrict attention to situations where both before and after the change the inquirer’s belief state satisfies requirements for logically omniscience. This seems to be absurd. And it is absurd if the inquirer in belief state \mathbf{K} is burdened with the obligation to recognize on demand all the consequences of his or her full beliefs. I have argued elsewhere for the view that the inquirer may be *committed* to fully believing that h without being able to fulfill the commitment on demand. The inquirer so committed ought to be prepared to acknowledge his or her failure when it is brought to his or her attention and should be prepared to improve his or her performance when opportunity and costs permit. But doxastic changes

that implement such improvements are not changes in doxastic commitment. Even though they play an important role in inquiry, they are not the changes that are the target of inquiry.

The belief changes that are central to inquiry are changes in doxastic commitment. I have suggested for a long time that changes in doxastic commitment that are subject to justification are expansions and contractions.

Expansions are changes from weaker commitments to stronger ones. \mathbf{K}_N is a consequence in the algebra of \mathbf{K}_I . The information contained in the initial commitment \mathbf{K}_I is included in the information contained in the new commitment \mathbf{K}_N . Contractions are changes from strong commitments to weak one where the inquirer gives up information rather than acquiring it.

Expansions may be described in terms of the information added to an initial state \mathbf{K} . The expansion of \mathbf{K} by adding potential state of full belief \mathbf{H} is $\mathbf{K} \wedge \mathbf{H}$ or $\mathbf{K}^+_{\mathbf{H}}$. To the extent that potential states are represented by deductively closed sets of sentences in L , the expansion is represented by $Cn(\mathbf{K} \cup \mathbf{H})$. $P_{Cn(\{\mathbf{K} \cup \mathbf{H}\})} \subseteq P_{\mathbf{K}}$. When \mathbf{H} is the set of consequences of a single sentence h , $Cn(\mathbf{K} \cup \{h\}) = \mathbf{K}^+_{\mathbf{h}}$ or expansion by adding h .

In contraction from \mathbf{K} , some of the possibilities ruled out by \mathbf{K} are added to the serious possibilities according to \mathbf{K} . If \mathbf{K} has as a consequence \mathbf{H}^c , contraction that removes this consequence has $\mathbf{K} \vee \mathbf{H}$ as a consequence. \mathbf{H} is no longer impossible. But the contraction could be stronger. It could have $\mathbf{K} \vee \mathbf{X}$ as consequence where \mathbf{X} is stronger than \mathbf{H} . We shall explore this some more later on.

Many authors take another kind of change in doxastic commitment to be more central than expansion or contraction. Revisions are changes in doxastic commitment where the inquirer adds information to \mathbf{K}_I whether or not the new information is consistent with the information in \mathbf{K}_I .²

Notice, however, that if \mathbf{H} is a consequence of \mathbf{K}_I and \mathbf{K}_N has \mathbf{H}^c as a consequence the inquirer starts with full belief that \mathbf{H} is true and from the perspective to which he is then committed deliberately replaces this conviction with \mathbf{H}^c . From the inquirer's initial state of full belief \mathbf{K}_I , making the change from \mathbf{K}_I to \mathbf{K}_N is replacing true by false belief. Anyone seeking to avoid importing false belief in making a change in full belief should not deliberately engage in such replacement.

This consideration seems decisive as an objection against recognizing deliberate revision of \mathbf{K}_I in the sense of Alchourrón et al. (1985) as a justifiable form of belief change. The objection is decisive provided the proximate goal of inquiry is to seek new, error free and valuable information at the stage where a change in belief is made. But alternative views of the goals of belief change are available.

- (a) One can hold that avoidance of false belief is a desideratum in inquiry where truth and falsity are assessed according to an "external" standard severed from

²When the information added is implied by \mathbf{K} , the revision is degenerate and identical with \mathbf{K} . When the information added is consistent with but not implied by \mathbf{K} , the revision is a nondegenerate expansion. When the information is inconsistent with \mathbf{K} , the revision is a *replacement* in the sense of Levi 1980.

any inquirer's point of view or as T.Nagel infamously put it, we consider truth according to the point of view from nowhere.³ In that case, the inquirer should recognize that H in K_I might be false as fallibilism requires even though K_I is the inquirer's standard for serious possibility.

- (b) One can follow John Dewey and Peter Gärdenfors in refusing to consider avoidance of false belief as a desideratum in inquiry.
- (c) One can embrace the Messianic Realism of Charles Peirce and Karl Popper and regard convergence on the true complete story of the world as an ultimate goal of inquiry. This Messianic Realism may be supplemented by the thesis that inquirers ought to get closer to the truth as a proximate aim of inquiry as Niiniluoto continues to advocate.
- (d) One can reject avoidance of error as a proximate aim of the next change in inquiry but insist that avoidance of error in some finite number of changes after the next change is such a goal.
- (e) One can embrace Secular Realism as I and W.V. Quine do and maintain that inquirers ought to avoid error as judged according to the evolving doctrine (i.e., according to K_I) as a proximate aim at the next change in inquiry. (Niiniluoto 1984).

The secular realist response (e) that I favor argues against the justifiability of revising K_I by adding information inconsistent with it in a single step. However, sometimes the net effect of such revision may be justified by justifying each step in a sequence of contractions and expansions.

The disagreement between secular realism and the alternatives is neither a metaphysical nor a semantic one. It is a question of values. Peirce and Popper thought that inquiry should be promoting progress toward the truth at the End of Days. Others might think that progress towards true answers is desirable but avoid the excesses of Messianic Realism. In any case, these approaches can spell out their conceptions of aiming at truth and allow truth and falsity to be judged from some agent's point of view. Cognitive values that should be pursued in inquiry are at issue. Truth and falsehood should be judged by the inquirer from the inquirer's initial state K_I of full belief when assessing the options available for change in full belief. Retrospective assessment is from the inquirer's view in state K_N . And others may judge the truth or falsity of the inquirer's beliefs before and after change from their own belief states. Only assessment of the truth or falsity of the inquirer's beliefs from the point of view from nowhere is incoherent.⁴

In any case, according to Secular Realism (the position I endorsed under the epithet "myopic realism" in Levi 1980) the direct justifiability of replacements is decisively rejectable. Of course, changes of belief state by revision can be

³Donald Davidson criticized this view. He argued that inquirers cannot coherently aim at truth (1998). Aiming at truth is, indeed, incoherent if it is judged from the point of view from nowhere rather than as Quine put it from the "evolving doctrine".

⁴If someone insists on the coherence of that point of view, it remains obscure as to the relevance of seeking to avoid error as judged from that point of view.

represented as compositions of sequences of contractions and expansions. And such changes are justified, if each contraction and expansion in such a sequence is justified. I dissent, however, from the popular point of view according to which revision \mathbf{K}^*_H by adding H is a response to an input importing H in the sense that \mathbf{K} is the initial state of full belief \mathbf{K}_I and \mathbf{K}^*_H is \mathbf{K}_N .

As already noted, the central concern of a discussion of justifiable belief change ought to be changes in full belief rather than changes in degrees of belief understood as degrees of credal probability.⁵ I have claimed for a long time that when X fully believes that H , X is committed to ruling out the *logical* possibility that H is false as a serious possibility. It is incoherent for X to fully believe (be certain) that H is true and at the same time to acknowledge that H might be false or that there is a small, perhaps infinitesimally small, probability that H is false.⁶

Many authors who preach the epistemological doctrine of fallibilism call into question the corrigibility of full beliefs i.e., the justifiable modification of full beliefs once endorsed.⁷ Epistemological (or doxastic) infallibilism maintains that when X fully believes (is absolutely certain) that H , X rules out the logical possibility that H is false as a serious possibility. If there is no serious possibility according to X that h is false, it seems puzzling to many how X can justifiably come to doubt that H .

⁵When I first advanced this view, I used 'knows' rather than 'fully believes'. I continue to think that *according to X* at time t , X fully believes that h if and only if X knows that h . That is because I define 'knows' as 'truly believes'. This definition is an expression of the epistemic ideals I have borrowed from the pragmatists who do not require that X justify X 's current beliefs but only changes in X 's beliefs and the view that truth is judged relative to the evolving doctrine so that according to X everything X fully believes is true. Notice that agent Y can agree that X knows that h when Y also fully believes that h and will disagree other ways. X and Y will agree that X knows that h if and only if X truly believes that h .

⁶To fully believe, to be certain, or to know that H is not equivalent to judging that the probability that H is 1. Setting aside the issue of indeterminacy in probability judgment, subjective or credal probability judgment assigns numerical values in the closed unit interval to potential states of full belief (or to propositions) and their complements when both are judged seriously possible according to \mathbf{K} . If H is fully believed and, hence, a consequence of \mathbf{K} , it carries probability 1 and is seriously possible while its complement is assigned probability 0 and is ruled out as impossible.

⁷In a well-known example of the conflation of infallibility and incorrigibility, R.C. Jeffrey (1965) argued that reasonable agents should not assign credal probability 1 to propositions because one cannot coherently shift down from probability 1 in conformity with modifying credal probability by Conditionalization. This sort of change in credal state is derivable from the inquirer's state of full belief and the credal probability determined for that state of full belief by the inquirer's credibility function (Carnap 1960) or confirmational commitment provided that the confirmational commitment remains unchanged while the state of full belief is expanded by adding the proposition e and the confirmational commitment satisfies the principle of *confirmational conditionalization* (Levi 1980, 4.3). Confirmational Conditionalization is a synchronic constraint on confirmational commitments. Temporal credal conditionalization is a procedure for changing credal probabilities if the state of full belief is expanded by adding a new item e of information. That temporal principle does not forbid giving up e . Indeed, as long as the confirmational commitment remains fixed, a change from \mathbf{K}^+_e to \mathbf{K} can be derived from confirmational conditionalization as long as the confirmational commitment remains fixed. Jeffrey took for granted that contraction of a state of full belief could not be justified. He did not offer a compelling case for this conclusion.

The puzzle is not premised on a contradiction between saying that X was certain that H but no longer is. There is no such contradiction. The issue is whether X can justifiably become uncertain (change from full belief that H to doubt as to the truth of H) if X is concerned to avoid false belief and maximize the value of information.

The justification should show how an inquirer X concerned to avoid importing false belief while seeking to increase the value of the information available could change views. The two desiderata of avoiding error and acquiring valuable information tend to be in conflict. The more probable X judges H to be, the lower the risk of error in coming to believe it and less the value of the information carried by h tends to be.

Suppose X initially fully believes that H , X may not change belief state, may replace full belief that H with full belief that H^c or move to a position of suspense between H and H^c by contracting from K by removing H .

From X 's initial point of view, remaining with the status quo incurs no risk of false belief.

From the same point of view, replacing full belief that H with full belief that H^c imports false belief deliberately. Replacements are indefensible given the goal of avoiding false belief while increasing the value of information.

Finally moving to a position of suspense between H and H^c by contraction incurs no risk of importing false belief. But the inquirer X will be deliberately giving up information in doing this. And given the goals of inquiry, gratuitous surrender of information looks indefensible.

If not only replacement but contraction also is indefensible given the goals of inquiry, the only kind of change that does not deliberately import error or give up valuable information appears to be expansion. Expansion does to be sure incur a risk of importing false belief. But incurring the risk may be justifiable in a manner compatible with the concern to avoid error as long as the value of the information promised compensates for the risk incurred.

To the extent that expansion can be justified along these lines,⁸ the inquirer can overcome the obstacles to giving up information in contraction. Contraction incurs a loss of valuable information. But subsequent inquiry stands some chance of enhancing the informational value of the state of full belief.

Changing from an initial state of full belief K_I to a contraction K_N implied by K_I is entertainably justifiable in at least two contexts:

- A. K_I is inconsistent and contraction amounts to retreat from inconsistency.
- B. K_I is consistent but has a consequence H^c where H is a conjecture that would contribute valuable information to X 's store of information were it (counter to the verdict of X 's current state of full belief K_N) true. Contraction removing H^c from K_N is contemplated in order to give a hearing to H .

⁸In Levi 1983; 1980, and 1991 I provide an account of the justification of expansion along these lines based on ideas developed in Levi. 1967a and 1967b.

Contraction from Inconsistency

The first puzzle to consider regarding context A is that in order to retreat from inconsistency, the inquirer needs to be in a state of inconsistency. $\mathbf{K}_I = \mathbf{K}_\perp$.

An inquirer's state of full belief can be inconsistent in one of two ways. X may be committed to a consistent state of full belief but his doxastic performances may be inconsistent. In that case, removing inconsistency involves either efforts at self-therapy or receiving help from others and their technologies. Indeed, not only must the agent extricate him or herself from inconsistency but must identify his or her consistent state of doxastic commitment. No one can humanly succeed in this endeavor completely. All flesh and blood inquirers are inconsistent in their performances. I have already indicated that I shall not be taking up the question of the considerable therapeutic and engineering tasks involved in realizing the local pockets of fulfillment of doxastic commitment that flesh and blood achieve. In this discussion, the kind of retreat from inconsistency involved in this achievement shall not be considered.

The sort of inconsistent state of full belief of concern here is an inconsistent state of doxastic commitment. The puzzle we need to address is how an inquirer who is rationally fulfilling his or her commitments could end up in such an inconsistent state without involvement in a performance failure? To deliberately expand into inconsistency is never justifiable if the common feature of the proximate goals of all efforts to change doxastic commitments is to obtain valuable new information without importing false beliefs. As long as X's state of full belief is consistent, X is committed to judging the inconsistent state \mathbf{K}_\perp to be false. To deliberately expand into inconsistency is to deliberately import false belief into one's evolving doctrine.

The inquirer, however, may deliberately incur a risk of importing false belief, and do so rationally, if some appropriate benefit compensates for the risk. In inquiry where the proximate aim is the acquisition of new and valuable error-free information, making well designed observations is undertaken on the assumption that the beliefs formed in response to the observations made have a good chance of being true and informative. And the inquirer may sometimes be convinced that the testimony of witnesses and experts is reliable and substantive. Consulting external sources of information of both varieties incurs some risk of error. But often such consultation is the only available way of acquiring information relevant to a certain investigation. The value of the information acquired may compensate for the risk of error incurred.

The acquisition of new beliefs via observation and the testimony of experts and witnesses is "direct" in the familiar sense that it is not inference from premises. The consultation involves implementing a program for letting inputs (such as sensory excitations or verbal testimony) determine what information to add to a state of full belief. The sensory inputs and verbal testimonies, however, are not premises from which the inquirer infers a new belief. The addition of a new belief is an outcome of a process initiated by the input. Whatever the psychological details of the process might be, the occurrence of the inputs (the sensory stimulations

or the testimony of the experts or witnesses) do not constitute a change in the inquirer's state of full belief in the doxastic commitment sense. If a change in doxastic commitment occurs, it is a response to that input in conformity with the program being implemented.

Pace Russell and generations of empiricists before and after him, the "data" acquired by such *routine expansion* is directly acquired without being immediately given. Even though the new beliefs are acquired *directly* (i.e., without inference), the acquisition presupposes background information relevant to assessing the reliability of the process of making observations or consulting experts.

Commitment to the program for routine expansion should be distinguished from commitment to implementing it. The inquirer may recognize someone as authoritative on some topic without consulting that agent. X may judge a procedure for making observations reliable without using it. Moreover, the inquirer may be committed in one or both respects without having undertaken the commitments deliberately. However, when undertaking commitment to a program for routine expansion is at issue or when implementing a program to which one is already committed is at issue, modeling the situation as a choice between programs for routine expansion is appropriate.

For purposes of analysis, it is useful to distinguish between the inquirer's point of view \mathbf{K}_{PI} prior to deliberately undertaking commitment to a program for routine expansion and the inquirer's point of view \mathbf{K}_I when deliberating as to whether to implement the program. We may say that at \mathbf{K}_{PI} , the inquirer *precommits* to endorsing the deliverances of an implementation of the program should an implementation be undertaken. At \mathbf{K}_I , the inquirer *commits* to the deliverances of an implementation of the program to which the agent is already committed.

From the inquirer's point of view \mathbf{K}_{PI} implementing a program for routine expansion being contemplated might lead to the formation of beliefs incompatible with \mathbf{K}_{PI} . And when the inquirer is considering implementation of a program already endorsed, implementation might lead to the formation of beliefs incompatible with the inquirer X's current full beliefs in \mathbf{K}_I . Routine expansion has the ability to be *conflict injecting*.

Yet, expansion into inconsistency does not deliberately add false belief to \mathbf{K}_I . The inquirer X has risked importing error for the sake of the information to be acquired and has lost the gamble. The outcome is that X has expanded into inconsistency \mathbf{K}_\perp from \mathbf{K}_I .⁹

Inadvertent expansion into inconsistency is a byproduct of the need to use routine expansion to acquire new information that, perhaps, could not be obtained at the time by other means. This kind of inconsistency does not represent failure to fulfill

⁹Regardless of whether the implementation is the product of habitual or customary practice or is deliberate, the inquirer is committed to implementing the program prior to its implementation. The inquirer is precommitted. The inquirer is (pre) committed to the results of implementing the routine regardless of what they might be. When the result is expansion into inconsistency, the importation of false belief is inadvertent.

commitment. To the contrary, it fulfills a commitment to follow a program of routine expansion regardless of where it might lead.

\mathbf{K}_\perp fails as a standard for serious possibility and as a resource for specifying truth conditions for hypotheses in a sense of truth according to which an inquirer should be seeking to avoid false belief. It seems obvious that inquirers should retreat from such inconsistency – i.e., contract from \mathbf{K}_\perp .

Contraction from inconsistency cannot be justified as the choice of the best option among the (epistemic) options available. Such justification should be based on the inquirer's point of view prior to choice. Prior to choice, however, the inquirer's point of view is inconsistent. An inconsistent state of full belief cannot be used coherently as a standard for serious possibility, for judging truth or as evidence. In Levi 1980, footnote pp. 59–60, I worried about this question of coherence. I suggested treating the language in which the inconsistent state of full belief is expressed syntactically and rationalizing changes in a consistent metalanguage. Olsson (2003) rightly took me to task for not living up to my own commitments concerning the characterization of the state of full belief as a standard for serious possibility. Olsson's objection seems unanswerable according to the approach I favor. But according to that approach, his proposed cure is worse than the disease. Olsson maintained that there are admissible programs for routine expansion that avoid expansion into inconsistency and that programs for routine expansion should be restricted to these. In Levi 2003, I showed that routine expansion is inescapably conflict injecting – counter to what Olsson claimed. The only way to avoid routine expansion into inconsistency is to avoid routine expansion altogether. This remedy seemed to be as unacceptable to Olsson as it is to me. I concluded that we need to consider other ways to address the predicament of how to justify retreat from inconsistency.

In Levi 2003, I suggested that a program for routine expansion should be accompanied by a precommitment to a plan providing a response in case implementation of the program leads to expansion into inconsistency. From the point of view \mathbf{K}_{PI} the inquirer can coherently identify a set of appropriate contractions from inconsistency and evaluate their merits.

Programs for routine expansion provide for expansions that yield many competing answers to a given question. As a consequence, expansion into inconsistency can take on a diversity of forms depending on the item of information h added to \mathbf{K}_I that yields inconsistency. Given a specific h , the plan stipulates that one of the following contractions from \mathbf{K}_\perp is implemented:

- (i) Return to \mathbf{K}_I . The expansion prescribed by the routine is nullified.
- (ii) Replacement of the consequence \mathbf{H}^c of \mathbf{K}_I by \mathbf{H} . The contraction from inconsistency recommended is representable as an expansion by adding \mathbf{H} to a contraction of \mathbf{K}_I by removing \mathbf{H}^c .¹⁰

¹⁰The equivalence of a replacement to an expansion of a contraction is the *Commensuration Thesis*. (Levi 1991, p.65) The Commensuration thesis is trivial as long the domain of potential states of full belief is partially ordered in a manner satisfying the requirements of a Boolean algebra.

(iii) Contraction of \mathbf{K}_I by removing \mathbf{H}^c .

Each of the three plans recommends returning the state of full belief to a potential state that is formally representable as a transformation of \mathbf{K}_I . The important point to be emphasized is that, nonetheless, each if the three plans implements a potential contraction from inconsistency.

Exercising option (i) is contracting from \mathbf{K}_\perp in a way that returns the state of full belief to the *status quo ex ante*.

Exercising option (ii) is also a move to a consistent potential state of full belief from \mathbf{K}_\perp . It is not a move from \mathbf{K}_I to a replacement of $\sim h$ by h in \mathbf{K}_I . It is a move from \mathbf{K}_\perp to the aforementioned replacement.

Similarly, option (iii) is a move from inconsistency to a contraction of \mathbf{K}_I by removing \mathbf{H}^c .

We should look at (i), (ii), (iii) as three optional precommitment plans for retreating from inconsistency. The three alternatives may be formally representable as transformations of \mathbf{K}_I . But the challenge that provokes consideration of them is an expansion of \mathbf{K}_I into inconsistency. The task to which all three are responsive is how to retreat from inconsistency.

Thus, even though retreating from \mathbf{K}_\perp is an option as a precommitment plan, remaining with \mathbf{K}_I is not an option. Similarly replacement of \mathbf{H}^c in \mathbf{K}_I by \mathbf{H} is not an option even though shifting from inconsistency to the replacement is. Similar remarks apply to contraction of \mathbf{K}_I by removing h .

Formally, replacement of \mathbf{H}^c by \mathbf{H} in \mathbf{K}_I is equivalent to an expansion by adding \mathbf{H} to a contraction by removing \mathbf{H}^c from \mathbf{K}_I . But as is well known, there are many contractions of \mathbf{K}_I that remove \mathbf{H}^c . We need some way of recommending which contractions removing \mathbf{H}^c from \mathbf{K}_I can serve as ingredients in contractions from \mathbf{K}_I in precommitment plans of the three types mentioned above.

Deliberation aimed at adopting a precommitment plan at \mathbf{K}_{PI} compares the admissible options of type (i), (ii) and (iii) and determines best or admissible precommitment plans from among these. Option of type (i) is formally the same as first contracting by removing \mathbf{H}^c and then expanding by adding \mathbf{H}^c . The type (ii) option (replacement of \mathbf{H}^c in \mathbf{K}_I by \mathbf{H}) is formally equivalent to an expansion by adding \mathbf{H} to a contraction of \mathbf{K}_I by removing \mathbf{H}^c .

Both (i) and (ii), therefore, are representable formally as an expansion of the potential state of full belief that is the outcome of contraction type (iii) where the inquirer is in suspense with respect to the truth of \mathbf{H} . The upshot is that the third option yields a belief state that carries less information and, hence, no more informational value than the other two options.

Suppose that result of implementing (i) is a belief state carrying more (less) informational value than the belief state resulting from implementing (ii). On the assumption (that I favor) according to which the inquirer should seek to minimize loss of informational value, if the inquirer should have to retreat from inconsistency due to having expanded \mathbf{K}_I by adding \mathbf{H}^c , the inquirer should follow option (i) or option (ii).

On the other hand, if options (i) and (ii) result in belief states carrying equal informational value or if they are noncomparable with respect to informational value, the inquirer should follow option (iii). This recommendation is based on the assumption that the informational value of the join of two potential states of full belief is the minimum informational value carried by the pair of states. This is the assumption I have used in evaluating loss of damped informational value in contraction in Levi 2004 and in Levi 1991 and 1997.

On this view, neither information acquired via observation nor from expert witnesses is categorically authoritative. If it were, option (ii) would be mandatory in all cases. All but the most rabid empiricists agree that the adoption of (ii) can be trumped when the information carried by the background beliefs to be given up is too valuable to surrender. Depending upon how valuable that information is, option (i) or (ii) is favored.

The expansion step used to define replacement of \mathbf{H}^c by \mathbf{H} in \mathbf{K}_I is uniquely determined by the contraction of \mathbf{K}_I by removing \mathbf{H} . So both options (ii) and (iii) are determined once we can identify the contraction of \mathbf{K}_I by removing \mathbf{H}^c . But such specification requires a choice from a roster of contraction strategies each of which removes \mathbf{H}^c from \mathbf{K}_I .

Keep in mind that such a “choice” is not a deliberate decision to implement such a contraction. It is not a deliberate choice of a contraction from \mathbf{K}_{\perp} . Nor is it a deliberate choice of a contraction from \mathbf{K}_I . If there is any deliberate decision involved it is a deliberate choice of a precommitment at \mathbf{K}_{PI} to a clause in the program for routine expansion precommitting the inquirer to an approach to contracting from inconsistency should routine expansion lead to inconsistency..

Even so, the decision concerning a contingency plan for contracting from inconsistency depends on answering the question: What should be a best or an admissible contraction removing \mathbf{H} from \mathbf{K}_I on the belief contravening supposition that a deliberate choice of a contraction removing \mathbf{H}^c from \mathbf{K}_I is required? The supposition of this question contravenes or should contravene the full beliefs of the inquiring agent. Even so, the question could be addressed as a problem of rational choice. Given a specification of the options and the payoffs, how should a decision be taken? In Levi 1991, I contended that that in such contexts of “coerced” contraction where the inquirer has no coherent option but to retreat from inconsistency, the inquirer still needs to decide “how to contract”.

Deliberate Contraction

A decision concerning how to contract also arises in the context of deliberate contraction from consistent \mathbf{K}_I in order to give a hearing to an informationally valuable conjecture.¹¹

¹¹In Levi 1991, ch. 4, I distinguished between coerced and uncoerced contraction and took note of the fact that both types of contraction require consideration of the problem of “How to Contract”.

Sometimes inquirers can be justified in contracting from initial \mathbf{K}_I even though \mathbf{K}_I is consistent. \mathbf{K}_I may be incompatible with \mathbf{H} so that X is committed to being certain that \mathbf{H} is false. Yet, X may regard \mathbf{H} as a hypothesis that would, if it were true, explain propositions in some interesting and important domain.

Thus, the general theory of relativity was incompatible with received doctrine even though it could if true explain the perihelion of Mercury. The behavior of Mercury may have been consistent with \mathbf{K}_I –i.e., with classical mechanics. However, the attempts to explain the perihelion of Mercury within the framework of \mathbf{K}_I were not successful. The trajectory of Mercury represented a stubborn anomaly within the framework of classical mechanics.

Contracting \mathbf{K}_I by removing \mathbf{H}^c so as to recognize the general theory of relativity as a serious possibility is a retreat from anomaly but not from inconsistency. The contraction is deliberately chosen over the option of remaining with \mathbf{K}_I in order to give a hearing for an important conjecture even though doing so incurs a loss of informational value.

The loss of informational value might be endured provided the inquirer has confidence that subsequent to contraction, inquiry to resolve the doubt (for example concerning the status of General Relativity) will be undertaken and will lead to removing doubts either by justifying return to \mathbf{K}_I by rejecting General Relativity or expanding \mathbf{K}_N by adding General Relativity. On that assumption, the inquirer can reason that either the informational value will be greater than that carried by \mathbf{K}_I or there will be no net loss in informational value.

This reasoning assumes (1) that the informational value obtained by adding General Relativity Theory to the contraction of \mathbf{K}_I by removing classical gravitational theory is greater than that \mathbf{K}_I and (2) that contraction removing classical gravitational theory from \mathbf{K}_I initiate inquiry warranting a resolution of the doubt. Otherwise reversion to \mathbf{K}_I is justified.

There is another assumption that deserves mention here. It concerns the import of the thesis that the goal of inquiry seeking to modify full beliefs is to increase informational value while reducing risk of error.

According to secular realism the concern to avoid error or reduce risk of error is restricted to the change in belief state being contemplated. It does not concern changes subsequent to the next one. Nor does it concern convergence to the truth in the limit.

The quest for valuable information by way of contrast takes a longer view. In contraction we seek to minimize loss of informational value. But this concern can be trumped by the expectation of a gain in informational value afforded by the subsequent inquiry.

This is the question of determining what should constitute contraction removing h from \mathbf{K} . I subsequently discussed this matter in Levi 1997. My final word on this topic (I think) is to be found in Levi 2004. I do not discuss this topic here but place emphasis on what I take to be the two important types of contraction.

There is no inconsistency in endorsing this asymmetry between the concern to avoid error and the aim of maximizing informational value. To be sure, I cannot demonstrate that the goals of inquiry should exhibit the asymmetry. There are many views of the aims of inquiry alternative to the one I am advocating. I think that the view of these goals being proposed gives us a sensible rationale for legitimate routine expansion, justified inductive expansion, coerced contraction and deliberate contraction superior to rival approaches that may be entertained.

Coerced contraction calls for a justification showing how to contract where it is determined already that some contraction from \mathbf{K}_\perp is to be implemented, that the contraction to be implemented is a contraction removing some specific proposition \mathbf{H} from \mathbf{K}_I , but where it is unsettled as to which contraction meeting this requirement to implement as a contraction from \mathbf{K}_\perp .

In deliberate contraction, there is no issue concerning retreating from inconsistency. There is a question as to whether to contract by removing proposition \mathbf{H} , proposition \mathbf{G} , etc. from \mathbf{K}_I or not. And given that \mathbf{H} is to be removed from \mathbf{K}_I , there is a question as to which contraction removing \mathbf{H} is to be implemented. The last issue raises a problem similar to the problem of how to contract that arises in connection to coerced contraction. Indeed, the similarity between the two problems concerning how to contract entitles us to explore them together.

How to Contract: The Available Options

In any decision problem, the rationality of the choice made depends on the set of options available to the decision maker – that is to say available to the decision maker *according to the decision maker's point of view*. In order for a proposition to represent an available option, the decision maker must be convinced of his or her ability to implement the option if he or she chooses to do so. The decision maker must also judge it a serious possibility that he or she will implement the option. If the decision maker fully believes that he or she will not make the choice, from the decision maker's point of view, deliberation directed at deciding whether to implement the option is pointless.

Deciding how to contract by removing \mathbf{H} is, so I assume, a problem for choice where the inquirer seeks to implement the best option available that if implemented would remove \mathbf{H} from \mathbf{K}_I .

Given the nature of problem, the domain of options from which choice should be made should be some subset of the contractions removing \mathbf{H} from \mathbf{K}_I . Should the set of options include all contractions removing \mathbf{H} from \mathbf{K}_I ?

This question is not well formed. A contraction removing \mathbf{H} from \mathbf{K}_I is a potential state of full belief. We need to identify the Boolean algebra Ω of potential states of full belief and then ascertain the subset of Ω consisting of contractions from \mathbf{K}_I removing \mathbf{H} . A customary view is to think of this algebra as the powerset of a set W of atoms conceptually accessible to the inquirer.

There are many reasons for resisting this idea:

- (a) Given any set W of atoms, an inquiring agent is conceptually capable of refining elements of this set. This yields a new set of atoms whose powerset consists of elements conceptually accessible to the inquirer. There is no set W of categorically atomic potential states of full belief. There is no set of maximally consistent belief states. There are no possible worlds.
- (b) Suppose, however, that we consider a very large domain W and the powerset generated by it. The inquirer may be interested in removing the proposition that G.W.Bush was properly elected President of the USA in 2000 from his or her state of full belief \mathbf{K} . A potential contraction removing this item from \mathbf{K} would be the join of \mathbf{K} with a set T belonging to the powerset of W each element of which is inconsistent with \mathbf{K} and at least one of which entails that Bush was not properly elected. But the elements of T might all specify information concerning famines in Africa, recessions in the USA and, indeed, detailed history of the world. This kind of information may be irrelevant according to the inquirer to topic of the inquirer's investigation. What we should be considering is a Boolean algebra of potential states of full belief that the inquirer is committed to judging relevant to this topic.

Instead of beginning with W and its powerset, consider a set U_{LK} of potential states of full belief where a potential state of full belief \mathbf{LK} entails the truth of exactly one element of U_{LK} and all elements of U_{LK} are consistent with \mathbf{LK} . Elements of U_{LK} represent the maximally specific potential states of belief that are deemed relevant by the inquirer to the topic under investigation. They generate an algebra of potential states of full belief and they should be conceptually accessible to the inquirer. However, members of U_{LK} need not constitute a logically exhaustive set so that \mathbf{LK} need not be a logical truth or conceptual necessity. Similarly the members of U_{LK} may be refined if more specific judgments come to be recognized as relevant. The elements of U_{LK} serve as atoms in the Boolean algebra constituted by the powerset of U_{LK} . Elements of the algebra constitute the set of potential states of full belief to be used in trajectories formed by belief changes of relevance in the kind of inquiries under consideration. Perhaps some good reason will arise for refining U_{LK} or adopting a weaker minimal state of full belief. The domain of potential states extends well beyond any atomic algebra we may utilize in characterizing changes in states of full belief.

\mathbf{LK} is the *minimal state of full belief* and U_{LK} is the *basic partition* for the purpose of characterizing changes in belief state that are relevant in the context of inquiry into a given budget of problems. The demands for information that are characterized by \mathbf{LK} and U_{LK} may be modified in the ongoing process of inquiry and different inquiries and their inquirers have different demands that may require the use of different minimal states and basic partitions.

If the inquirer X is in state of full belief \mathbf{K} , elements of U_{LK} consistent with \mathbf{K} are elements of the *ultimate partition* $U_{\mathbf{K}}$ relative to \mathbf{K} . Elements of U_{LK} inconsistent with \mathbf{K} constitute the *dual ultimate partition* $U^*_{\mathbf{K}}$.

Given \mathbf{LK} and U_{LK} , a potential contraction of \mathbf{K} is representable by the join of \mathbf{K} with the join of a subset T of $U^*_{\mathbf{K}}$.¹² The contraction is a contraction removing \mathbf{H} from \mathbf{K} if and only if at least one element of T entails \mathbf{H}^c .

A maxichoice contraction removing \mathbf{H} from \mathbf{K} is a contraction removing \mathbf{H} from \mathbf{K} where T contains only one element and it entails \mathbf{H}^c .

A contraction removing \mathbf{H} from \mathbf{K} is saturatable if and only if exactly one element of T entails \mathbf{H}^c ,

A partial meet contraction removing \mathbf{H} from \mathbf{K} is a contraction removing \mathbf{H} from \mathbf{K} where every element of T is a maxichoice contraction entailing \mathbf{H}^c .

The options available for choice to the agent X concerned to contract by removing \mathbf{H} from \mathbf{K} given \mathbf{LK} and U_{LK} consist of all contractions removing \mathbf{H} from \mathbf{K} relative to \mathbf{LK} and U_{LK} (or relative to \mathbf{K} and $U^*_{\mathbf{K}}$).

How to Contract: Minimizing Loss of Informational Value

According to a decision theoretic approach to contraction, one should begin with an explanation of how the goals of contraction determine a value structure for the set of available options (the potential contractions removing \mathbf{H} from \mathbf{K}). A value structure (Levi, 1986) is representable by a set of permissible utility functions. An option is V -admissible if and only if it comes out best among the available options according to at least one permissible utility function. In the special case where, the set of permissible utility functions is unique up to a positive affine transformation, the V -admissible options coincide with the set of options that come out best according to all permissible utility functions.

I assume that when the inquirer is to contract in a manner that removes \mathbf{H} from \mathbf{K} , he should choose a contraction removing \mathbf{H} from \mathbf{K} that minimizes loss of informational value if such an option is available. Every contraction removing \mathbf{H} from \mathbf{K} yields a potential state relative to \mathbf{LK} and U_{LK} that is the join of \mathbf{K} with the join of a subset T of U_{LK} that contains at least one element that implies \mathbf{H}^c . Two factors determine the loss of informational value incurred:

- (a) An evaluation of the informational values of elements of U_{LK} . I adopt a numerical measure $cont(x) = 1 - M(x)$ as the measure of informational value of an element of U_{LK} . Here $M(x)$ is a finitely additive probability measure over the algebra generated by U_{LK} .
- (b) An extension of the evaluation of elements of U_{LK} to the entire algebra generated by U_{LK} .

¹²The contraction is also characterized as the intersection of the set of consequences of \mathbf{K} and the set of consequences of T .

If the extension is the finitely additive probability mentioned in (a), the assessment of informational value is given by $1 - M(x)$ for all x in the algebra. This is the *undamped* assessment of informational value.

There is an alternative assessment – the *damped assessment of informational value*. Given any finite subset S of the powerset of U_{LK} , the damped informational value of the join of S is the minimum value assigned to an element of S .¹³

In discussing contraction, we are interested in subsets of the dual ultimate partition U^*_K given \mathbf{K} . The dual ultimate partition is, of course, a subset of the basic partition. The informational value of a subset T of U^*_K is the minimum of the informational values assigned elements of T and hence the maximum value of informational value determining probability M . This maximum exists as long as T is finite. We shall consider cases where U^*_K and, hence, T is finite.

In Levi 2004, I proposed that contraction from \mathbf{K} removing \mathbf{H} should be assessed by evaluating the damped informational value of every contraction from \mathbf{K} removing \mathbf{H} recognized by \mathbf{K} and U^*_K and restricting choice to contractions that minimize loss of damped informational value.

I also proposed a rule for Ties that recommended choosing the weakest contraction minimizing loss of informational value.

This proposal is intended for cases where the inquirer is committed to evaluating damped informational value based on a numerically determinate probability distribution over U_{LK} .

In general, inquirers will not be committed to such numerically determinate assessments but rather to a set of permissible assessments. I contend that the set should be convex. The recommendation is to choose the weakest of the *V-admissible* contraction.

The result is that the appropriate contraction removing \mathbf{H} from \mathbf{K} should be what Rott and Pagnucco call “severe withdrawal” and I call “mild contraction” for situations where the evaluation of loss of informational value is numerically determinate or is representable the restriction of the set of probability distributions over U_{LK} to elements of U^*_K . that weakly order the elements of U^*_K and, hence, maxichoice contractions from \mathbf{K} whether they remove \mathbf{H} or not.

Moreover, the recommendation is based on appeal to an account of rational choice appropriate both for cases where the options are weakly ordered and where weak ordering fails.

If the domain of options were to be restricted to the domain of partial meet contractions removing \mathbf{H} from \mathbf{K} , and the assessment of informational remains numerically determinate or at least free from ordinal conflict, the recommendation would coincide with the recommendation of those who subscribe to the AGM account of contraction.

¹³In Levi 1991 and 1997, I proposed a variant on the damped informational value assessment. I abandoned it in Levi 2004. I called the earlier variant “version 1 damped informational value” and the later one version 2 damped informational value. In Rott (2006), Hans Rott showed that my characterization of version 1 was seriously defective. In Levi (2006), I showed how to repair the defect. But there were other reasons including comments by Hansson and Olsson (1995) that argue for abandoning version 1 damped informational value. I rehearse them in Levi (2004).

But the AGM account provides no decision theoretic basis for restricting the domain of options to just the partial meet contractions.

I do not mean to suggest that arguments have not been given in support of partial meet contraction. David Makinson has offered at least two. The first points out that every contraction removing \mathbf{H} from \mathbf{K} that is not the join of a subset T of $U^*_\mathbf{K}$ all of whose members entail \mathbf{H}^c is the join of a subset T' that is the union of just such a subset with another whose members entail \mathbf{H} . This “withdrawal incurs a greater loss of information than is incurred by using the partial meet contraction.

If we think of this argument decision theoretically, it presupposes that the goal of contraction should be to minimize loss of information rather than informational value. This is not a goal to which many, including Makinson, would subscribe; for if endorsed it favors restricting choice to maxichoice contractions removing \mathbf{H} from \mathbf{K} .¹⁴

¹⁴H. Rott (2006) declares that my recent proposal for assessing loss of informational value (damped informational value version 2) is strongly counterintuitive. The basis for his charge is that the recommended contraction could be the disjunction of a great number of maxichoice contractions each of which on its own incurs a great loss of informational value. But this basis presupposes what I deny – to wit, that the aim of contraction is to minimize loss of undamped informational value. Rott also insists that my proposal is sheer definition or stipulation. The only sense in which this is so is that damped informational value version 2 represents one among many utility functions that might be candidates for representing the value of information. I do not deny that rational agents could have different preferences. But the alternatives do not appear appetizing. Consider the interesting results reported in Rott (1993, 2001). Rott has explored choice functions over a domain of maxichoice functions and the preference relations thus generated. In cases where the choice function yields a set of two or more maxichoice contractions as optimal, he *stipulates without appeal to decision theoretic considerations* implementation of a corresponding partial meet contraction. Having done this he establishes a connection between choice consistency conditions for choice functions defined over the domain of maxichoice contractions and important axioms for contraction. Had he adopted a version 2 damped informational value utility function over the power set of the maxichoice contractions removing \mathbf{H} the correspondence Rott identifies could have been rationalized decision theoretically rather than by stipulation. Even with this improvement, the approach still restricts the options to the set of partial meet contractions without any decision theoretic rationale for doing so whatsoever. I do not deny that Rott has established a correspondence between choice consistency over maxichoice contractions and axioms for contraction. Such a correspondence may satisfy philosophical logicians. But I do not see how it could satisfy anyone interested in a decision theoretic rationalization of contraction.

Pagnucco and Rott (1999) do consider the full range of contractions removing \mathbf{H} as options. But, as Rott says, they think of the goals of contraction in such cases as being informational value and fairness (expressed by rule for Ties) which are conflicting primary desiderata.

I cannot prove anyone irrational who takes this position but I think it is obviously untenable. When two potential contractions removing \mathbf{H} minimize loss of informational value, one may break ties by suspending judgment – which involves moving to a weaker contraction than either of the two – *provided that this contraction does not incur a greater loss in informational value*. If it does, invoking the rule for Ties is untenable. If it does not, then even if the rule for ties recommends favoring a contraction weaker than the two options that carry the same informational value that it does, it recommends minimizing loss of informational value. Why should Pagnucco and Rott deny this? I suspect that they think that suspending judgment between two options that minimize loss of information or informational value cannot coherently minimize loss of information or of informational value. This is so for information. But why do they insist that it is so for informational

The second argument alludes to the fact that every withdrawal is revision equivalent to a partial meet contraction. That is to say, expanding the partial meet contraction and expanding the revision equivalent withdrawal yield the same revision of K . Here the revision is an AGM revision.

Consider the following transformation of K by adding K . The Ramsey revision of K by adding H is the same as AGM revision in two cases: (i) K is inconsistent with H , (ii) K is consistent with both H and H^c . In case (iii) where K is inconsistent with H^c , AGM revision by adding H is an identity transformation. Ramsey revision requires contraction by removing H and then expanding by adding H .

If the Recovery postulate for contraction is applicable, AGM revision and Ramsey revision are equivalent. But Recovery should fail in many cases – most notably statistical examples. If X knows that coin has been tossed and landed heads and then contracts by removing the claim that the coin has been tossed, X should give up the claim that the coin landed heads (or, indeed, that it landed at all). Restoring the claim that the coin has been tossed will restore the claim that the coin landed on the surface but not that it landed heads. In that case recovery fails and AGM revision is no longer equivalent to Ramsey revision.

Although every withdrawal is AGM revision equivalent to a partial meet contraction, it is not Ramsey revision equivalent to a partial meet contraction. If the view of legitimate belief change I have been sketching is along right lines, neither form of revision plays a central role in justifying belief change. Revision comes into its own when an analysis of modal judgment on a supposition is on offer. I contend that such Ramsey revision is more adequate to this task than AGM revision.

Hans Rott (1993, 2001) has offered a representation of the preference among maxichoice contractions in terms of choice functions. Given a choice function over the domain of maxichoice contractions removing H , the value of the function is the set of optimal maxichoice contractions removing H . The contraction determined by the choice function is the join of the set of optimal maxichoice contractions and is the partial meet contraction. This join is not, in general, a maxichoice contraction and, hence, is not a member of the value of the choice function examined by Rott. But it is join of the maxichoice contractions in the value of the choice function.

One could examine choice functions that take as arguments sets of contractions removing H whether they are maxichoice or not. Rott does not develop an account of preference over all contractions that shows that the meet contraction is best among all the options available to the decision maker. He does show that the most preferred maxichoice contractions removing H from K can be used to define a partial meet contraction. But given his restricted account of the domain of the choice functions, Rott cannot show that the recommended partial meet contraction is optimal.

It would have been easy for Rott to have obtained this definition of partial meet contraction in terms of choice functions (at least in the finite case) had he extended his choice functions from the domain of maxichoice contractions removing H from

value? If it were true, minimizing loss of informational value would lead straightforwardly to choosing maxichoice contractions a consequence he acknowledges is untenable.

K to the powerset of this domain (that is to say, the set of partial meet contractions). Given any set of maxichoice contractions, its value would be the best of the values of the maxichoice contractions.

But even if Rott had taken this step, he would not have provided a satisfactory decision theoretic account of contraction because he would not have explained decision theoretically why “withdrawals” are left out of account. Using damped informational value (that is to say the type 2 or second version), it is possible to account for withdrawals.

My aim here has been to sketch the rationalization I have offered for a decision theoretic approach to how to contract that completes the account of coerced contraction and deliberate contraction outlined in previous sections. Given that account, the corrigibility of the inquirer’s point of view, from the inquirer’s point of view, is justifiable even though the inquirer to be coherent is committed to ruling out the serious possibility that his or her current point of view is in error.

Curiosity and Corrigibilism

As I have done throughout most of my career, I have been maintaining that the belief states that are targets for justifiable change are states of full belief. Such states serve as standards for serious possibility. From the point of view of the inquirer who makes the judgment of serious possibility, there is no serious possibility that what the inquirer fully believes is false. The inquirer is committed to epistemological infallibilism.

The main philosophical tradition maintains that such a view is untenable because it implies epistemological incorrigibilism. I deny this. The inquiring agent is sometimes warranted in contracting his or her state of full belief.

My argument for this view is based on the legitimacy of both routine expansion and deliberate or inductive expansion.

Routine expansion is potentially conflict injecting. If we are to acknowledge the legitimacy of such expansion whether by appealing to the testimony of the senses or of competent witnesses and experts, programs for routine expansion must provide contingency plans for contraction in case inconsistency inadvertently arises.

Deliberate contraction to give informationally valuable propositions a hearing can be rationalized only on the assumption that subsequent to such contraction, expansion will be legitimate that affords a promise of removing the doubts that are raised. Sometimes routine expansion may be all that is required. But when the conjectures to be given a hearing are highly theoretical (as is the case with General Relativity Theory), deliberate or inductive expansion may be needed.

Expansion, so I claim, is legitimate as long as the quest for valuable information may be seen to compensate for the risk of importing error incurred in expansion. If we are to avoid the dogma that equates infallibilism with incorrigibilism, we need to follow William James in rejecting W.K. Clifford’s emphasis on the avoidance of error as the sole desideratum of inquiry.

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