Coping with Cognitive Limitations: Problems of Rationality in a Complex World

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Synopsis

(1) In cognitive and practical contexts alike, even the most rational of problem-solutions can misfire in situations of incomplete information. For in all rational deliberation the conclusion must be a function of the premisses. The prevailing state of our information will—and should—decisively affect the determination of what is the best thing to do or to think. In consequence any changes in or additions to the available information can—and should—affect our issue-resolutions. And here future changes are presently unforeseeable. (2) We must act on the basis of what our conscientious cognitive efforts can here and now provide, recognizing that our available information in highly complex matters is generally less than adequate—let alone complete. Accordingly, in the informatively problematic setting of a complex world, reason faces the predicament of acknowledging that it must call on us to do that which, for aught we know, may in the end prove totally inappropriate.

1. Stage-Setting for the Problem: Issue Resolution Hinges on Available Information

Science is an inherently dynamical venture; the theories and thesis of one scientific era will—and because of technological progress must—differ from those of another. And the wishes and preferences of scientists notwithstanding, the world-picture that they deliver into our hands becomes increasingly complex over time. The history of science is a story of the ever-renewed realization that things were not so simple as they seemed. What does this increasing complexity of our understanding of the world's ways portend? The answer has some rather ominous consequences—not just for matters of belief but for matters of practice as well.

Rational action encounters serious challenges in a complex world. For in such a world the information at the disposal of limited beings is bound to be incomplete, and in situations of imperfect information their very rationality can lead rational agents into difficulty. This becomes apparent with even the most simple of problem-solving situations. For consider such cases as the following:

Case 1: Informational gap-filling
DATA: A manuscript note contains the (partly illegible) passage: 'He sent her a l-tter...'.
QUESTION: How is that gap in 'l-tter' to be filled in?

Case 2: Probabilistic reasoning
DATA: 1. X is a mechanical engineer.
2. 90 per cent of mechanical engineers are male.
QUESTION: How probable is it that X is male?

Case 3: Inductive inference
DATA: A sequence starts 1, 10, 100.
QUESTION: What are we to expect at the 10th place?

Case 4: Prudential decision
DATA: 1. It is starting to rain.
2. Yonder large tree affords the only shelter in the large, flat meadow that we are crossing.
QUESTION: Where should we go?
Case 5: **Expect intervention**

DATA: 1. X suffers from asthma.
2. Antihistamines are the most effective available medicament for (most cases of) asthma.

PROBLEM: What course of action should we recommend to X?

In each case, we face a perfectly possible and clearly delineated situation of choice. And in each instance the “rationally appropriate resolution” seems rather obvious and straightforward. But now consider what happens when some additional, supplementary information is added. Let us assume that in these five cases we acquire some further information:

Case 1: The passage continues: “to transport her wounded brother”.

Case 2: We are also informed that X gave birth to a bouncing baby boy last week.

Case 3: We are further told that the sequence continues 1, 10, 100, 1, 10, 100, for the next six entries.

Case 4: We are given the supplemental datum that there is also much lightning and thunder.

Case 5: We are also informed that X is highly allergic to antihistamines.

Clearly, one and the same phenomenon recurs throughout. Informatively more amply grounded choices may or may not be better, but they will frequently be different. In all sorts of cases, the rational resolution of a problem is highly context-sensitive to the information in hand in such a way that what is a patently sensible and appropriate resolution in a given data-situation can cease to be so in the light of additional information – information that does not abrogate or correct our prior data, but simply augments it. Often as not, additional ramifications complicate matters by destabilizing seemingly obvious resolutions. For exactly what qualifies as the most rational resolution of a particular problem of belief, action, or evaluation is bound to depend upon the precise content of our data about the circumstances. And this dependency so functions that a “mere addition” to our information can radically transform the situations as regards optimality. For, as those preceding examples indicate, a mere amplification of the known circumstances may well indicate the appropriateness of doing something totally incompatible with that initial optimum. The fact is that the rationally appropriate resolution of a problem on the basis of one body of evidence or experience can always become undone when that body of evidence or experience is not actually revised but merely enlarged.

It is just here that complexity makes for difficulties. Whenever we operate in complex situations we are constantly involved in learning new facts about them – facts which can all too easily upset the applecart of our previous ideas. We thus confront the situation generated by the confluence of two considerations: that the rationality of a problem-resolution is “information-sensitive,” and that amidst the complexities of the real world our information is always incomplete.
The rationally appropriate approach in any situation of problem solving—be it cognitive or practical—is to strive for the best resolution achievable in the light of the available data. Rationality enjoins us to adopt the optimal option: having surveyed the range of alternatives, the appropriate thing to do is to resolve the choice between them in what is, all considered, the overall most favorable way. What is “favorable” will of course differ in some ways from context to context. But the fact remains that rationality is a matter of optimization relative to constraints—of doing the best one can in the prevailing circumstances. Yet in complex settings, circumstances are bound to change in the light of fuller understanding. And it is a trite fact—which nevertheless has enormously far-reaching implications—that the deployment of intelligence or incomplete information may well yield inadequate solutions.

The history of the empirical sciences affords a familiar illustration. Beliefs in the luminiferous aether, the conservation of matter, and the like, were all sensible and rational in their day. Achieving a substantial enlargement of the data base on which we erect the structures of our theorizing generally produces those changes of mind characterized as “scientific revolutions.” As significantly enhanced experimental information comes to hand, people are led to resolve their problems of optimal question-resolution in radically different ways.

In cognitive and practical contexts alike, even the most rational of problem-solutions can misfire in situations of incomplete information. For in all rational deliberation the conclusion is and must be a function of the premises. The prevailing state of our information will—and should—decisively affect the determination of what is the best thing to do or to think. And in consequence any changes in or additions to the available information can—and should—affect our issue-resolutions.

We standardly operate on the presumption that the available information is adequate to permit the appropriate resolution of the problems we face. (After all, we have no option but to do the best we can with the means in hand.) But all too frequently this presumption turns out ultimately falsified. Yet twentieth-century medicine is naturally not deficient for failing to apply twenty-first-century remedies. Rationality, like politics, is an art of the possible—a matter of doing the best that is achieved in the overall circumstances in which the agent functions—cognitive circumstances included. Our best-available judgments—not only as to the actualities of things but also as regards their plausibilities and probabilities—will always be conditional judgments formed in the context and against the background of the then available information as best we can determine it. And in this sphere future changes are presently unforeseeable.

It will not do to react to this state of affairs by saying: “Delay decision until your experience is perfected and your information altogether complete.” To postpone a decision until then is tantamount to preventing its ever being made. A rationality we cannot deploy here and now, amidst the realities of an imperfect world, is altogether useless.

Still, the situation that we face is an ironic one. Categorical (unconditional) rational appropriateness always hinges on the total circumstances, involving the entirety of relevant information, be it present and absent. But obviously this second factor of “absent information” poses difficulties. In this world, our circumstances are inevitably sub-ideal, our information unavoidably incomplete. The inconvenient fact is that here, as elsewhere, we simply cannot determine that nothing outside our cognitive reach has a certain character or tendency—that this is more than we can ever actually manage.
2. Ideal vs. Practical Rationality: The Predicament of Reason

We have no better alternative but to act on the basis of what our conscientious cognitive efforts can here and now provide, recognizing that our available information in highly complex matters is generally less than adequate – let alone complete. Accordingly, in the informatively problematic setting of a complex world, reason faces the predicament of acknowledging that it must call on us to do that which, for aught we know, may in the end prove totally inappropriate.

The Predicament of Reason residing in the irresolvable tension between the demands of rationality and its practical possibilities comes to view in the following aporetic situation:

1. As agents who pretend to rationality, we ought to act as fully rational agents do, namely to do what is in fact the rationally optimal thing.
2. We can do no more and no better than to opt for what appears to be the best option in the circumstances.
3. It cannot reasonably and rationally be asked of us to do more than the very best that is possible in the circumstances.
4. What appears to be the best option in various circumstances may not actually be the best option.

Since these theses are mutually incompatible, one of them must be sacrificed, and since (2) and (4) represent unavoidable “facts of life,” and (3) seems unavoidable, it would seem that (1) must be abandoned in the interests of consistency-restoration. Yet neither the rationality-abandonment of (1)’s rejection nor the unrealistic perfectionism of (3)’s rejection are attractive options. And the resulting situation is a thoroughly uncomfortable one – whence the characterization of a predicament.

Fortunately, the difficulty that arises here admits of a sensible resolution. The distinction between idealized and practicable rationality offers a way out of the discomfort of a sacrifice of (1). For we must distinguish between: (i) IDEAL rationality, which is geared to those resolutions that are rationally appropriate with absolutely everything relevant taken into account – that are optimal pure and simple, and (ii) PRACTICAL rationality, which is geared to resolutions that are rationally appropriate with everything relevant taken into account that we can effectively manage to take account of in the prevailing circumstances – resolutions that are optimal as best we can manage to tell. This distinction softens the impact of rejecting that initial pivot-premiss of the predicament. For, while we cannot indeed achieve the impracticable demands of hyperbolic ideal, we clearly should do all we can in the direction of practicable rationality.

The crux of the matter is that rationality is not a matter of absolute optimization but of circumstantial optimization, not of doing what is the unqualifiedly best thing but of doing the best that can be done in the circumstances – including the informational circumstances – that are at issue. Consider the following illustration:

1. One has a severe headache.
2. In actual fact, yonder tablet is a (perfectly harmless) aspirin pill that will cure one's headache.
3. One has every reason to believe that yonder tablet is a deadly poison.

What is the rational thing to do? Clearly, it is to avoid taking the tablet. The irrationality of acting contrary to the indications of circumstantially manageable optimization is not redeemed by the unforeseeably favorable issue of events.
After all, ideal rational optimally is something merely "utopian" and "pie in the sky." For us, the only practicable optimally is that which is realistic and achievable – optimally as best we can get hold of it, which accordingly remains merely apparent optimally. All we can ever secure in real-life situations of rational deliberation are seeming optima arrived at in the light of incomplete information. We can have no assurance that they will continue to be optimal in the light of a fuller appreciation of the circumstances. We can only do our best.

"But the problem is created by mere ignorance." True enough! But true in a way that provided no comfort. Imperfect information is an inevitable fact of life. A "rationality" that could not be implemented in these circumstances would be totally pointless. Were rationality to hinge on complete information, it would thereby manifest its irrelevance for our concerns. There is nothing "mere" about ignorance regarding how matters actually stand in this complex world of ours.

If we had "complete information," and in particular if we knew how future efforts would eventuate – how matters will actually turn out when we decide one way of another – then rational decision-making and planning would of course become something very different from what they are. But all we can ever do is to be rational in the circumstances as best we can determine them to be. If rationality were only possible in the light of complete information it would perforce become totally irrelevant for us: It lies in the inevitable nature of things that we must exercise our rationality amidst conditions of imperfect information. A mode of "rationality" capable of implementation only in ideal circumstances is pointless; in this world, the real world, there is no work for it to do. We have to be realistic in our understanding of rationality – recognizing that we must practice this virtue in real rather than ideal circumstances. In fact, to ask more of rationality would not itself be rational. A conception of rationality that asks no more of us than doing the best we possibly can is the only one that makes sense – anything else would be ipso facto irrelevant. Clearly, if rationality is to be something that one can actually implement, then it has to be something whose demands can be meet in sub-ideal conditions – conditions of incomplete information as we (inevitably) confront them.

This sort of situation obtains throughout all areas of rational deliberation: cognitive, prudential, evaluative – right across the board. Even our optimally evidentiated beliefs are not necessarily true; even our optimally well-advised actions are not necessarily successful; even our optimally crafted appraisals are not necessarily correct. The reality of limitation meets us in every direction.

We are comparatively simple creatures living in a comparatively complex world; And for this reason we occupy a position in which a good deal of skepticism is warranted. Not that we do not know anything – or indeed a great many things – but in a complex world our knowledge is bound to be of a changing, dynamic, progressive character, so that our presently available knowledge is imperfect – at any and every present. Evolution has equipped us with an intellect adequate to fare satisfactorily (though certainly not perfectly) with the environment as we find it – sufficiently to cope effectively in the statistical average with the situations relating to our well being as regards survival and reproduction. All the same, our knowledge is bound to be frequently inadequate to the situation that actually confronts us. And the problems of praxis that result are formidable, since we know full well on general principles that the actions we deem appropriate on the basis of even the most careful exploration of incomplete information can readily turn out to be entirely ineffective and inappropriate.

The most we can ever possibly do – and the most that can be asked of us in the name

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of rationality – is to do the best we can manage to do under the prevailing conditions. And when one combines this with the consideration that we humans virtually always labor in circumstances of incomplete information we see that rationality is a resource of inherently limited utility.

We simply have to come to terms with the predicament of reason: the circumstance that reason constantly calls on us to do that which, for ought we know, may prove totally inappropriate. Rational action in this world has to proceed in the face of the sobering recognition that while we doubtless should do the best we can in the circumstances, this may nevertheless eventuate as quite the wrong thing. It is the course of reason (1) to aim at the absolutely best, but (2) to settle for the best that is realistically available. (After all, it would be unreasonable, nay irrational, to ask for more.) But the paradox lies in our clear recognition of the tension between the two.

Reason's predicament inheres in the fact that while the ideal ends of rationality are achieved only under the ideal conditions of global totality, nevertheless the actual practice of rationality must inevitably be conducted at the level of local and imperfect conditions. We can never rest complacently confident that in following reason's directions we are not frustrating the very purposes for whose sake we are calling upon the guidance of reason. We have to recognize the "fact of life" that it is rationally advisable to do the best we can, while nevertheless realizing all the while that it may prove to be inappropriate. Reason calls on us to act on the basis of the best information that our conscientious efforts can here and now provide – notwithstanding the recognition that they may not in the end prove to be sufficient.

Rationality is undoubtedly the best resource that we have, but there is no failproof assurance that in the conditions of incomplete information that obtain in a complex world its guidance will prove good enough. And yet while rationality is an imperfect resource, there is nowhere else where we can – rationally – go. Virtually by definition, the rationally appropriate resolution will, in the circumstances, afford our best choice.

There thus stands before us the profound lesson of the biblical story of the Fall of Man, that in this complex world of ours there are simply no guarantees – not even for a life conducted on principles of reason. It is this sobering situation – doubtless unwelcome, but inevitable – that betokens the Predicament of Reason: the circumstance that rationality requires us to do "what seems best" in the full and clear recognition that this may well fail to be, in actuality anything like the best thing to do.¹

Notes

¹ Some of the themes of this paper are also addressed in the author's *Rationality* (Oxford: Oxford University Press, 1988).