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Literate Experience. The (De-, Re-) Interpretation of Nature

> Yet up to now ... experience has not yet become literate. [...] Only when ... experience learns to read and write can we hope for improvement.
> Francis Bacon, *Novum Organum*, I:101[2]

Experience is the laggard pupil who must learn to read. Experience is also the master who writes on an empty slate and teaches us all we know. Has empiricism ever been constant in its theme? Experience is of nature, and what she must learn to read is the Book of Nature. What she must learn Bacon also calls the Interpretation of Nature – interpretation into our own language, whose faults and deficiencies are Bacon's despair.

I am an avid Eco's reader, and never more avid than on the subject of interpretation. Here I will begin with Bacon, and eventually attempt some Eco exegesis. My main guiding question will be: does the theory and practice of text interpretation give us, yes or no, a clue, a telling parallel, or fruitful analogy for the scientific study of nature today?

1.

Let me begin with a story. Today, unfortunately, we are no longer able to believe stories, any stories at all. Every examination of our own past, any history of our country or civilization, every science takes on the tell-tale signs of narrative as we spin it out before our own eyes or our audience. We've long since begun to recognize those signs. Any attempt at truth-telling soon begins to show those signs of narrative strategy, rationalization, defensiveness, vainglory, self-exculpation, or self-incrimination, and so becomes doubtful. We place it in brackets, suspend judgment, regretfully: for a moment, there, we thought we were seeing what is true and real, but it was just a story after all, once again...

What I have just written is a story. It is a story about us, today, about

[1] The author wishes to acknowledge research support by the Infinity Foundation.

[2] The edition I've used is Francis Bacon, *Novum Organum, With Other Parts of the Great Instauration*. Tr. ed. P. Urbach and J. Gibson. Chicago: Open Court, 1994.

us post-moderns, us who have lived and learned through the 20th century. Is that story true? Well, that depends on who *we* and *us* are. If I count as among us only those of us whose experience it truly describes, then of course the story is true – trivially so. If I use "we" to include all my friends and acquaintances (let alone those few others who make up the rest of the world) it is false. Here are three concrete examples, of people I know, who are not like that. I tell you about them impartially, utterly neutral, without judgment. The first, A, believes the Biblical narrative, for the most part. When necessary, he fills the gaps. I asked him how Peter knew, in the Transfiguration, that those other persons were Moses and Elijah? Perhaps, A replied, Jesus told them, or perhaps he heard Jesus greeting them by name.

B is a woman from the South. As is common there, she was not taught evolution in school, but only "creation science". Now enrolled in a college biology program, she fervently believes the story of evolution. When necessary, she fills the gaps. I asked her about the eye. In the early stages, that curious growth, 5% of what could eventually function for vision, could have had no survival value. Well, she said, some genes piggy-back on others; some early evolutionary stages of organs had other, now unclear, functions – some such thing must have happened.

The third of my friends, C, is a scientific realist and materialist. His credo, he told me is that only material things exist in this world, only matter. Asked what this word "matter" denotes, whether Democritean atoms, Descartes' *res extensa*, Newton's forces – he replied: things made up of the elementary particles described by current physics. I mentioned a recent physics article arguing that these particles do not exist (because particle number is not a relativistic invariant, any more than up/down or long/short). So, I asked, suppose physics were to change drastically, and teach that what you refer to as "matter" is not real, but something else is. Then would you have compelling reason to renounce materialism? After some thought he concluded that he had not properly understood his own position. Matter is not, after all, to be conceptually identified with what is composed of elementary particles. There is such a thing as objective similarity, he said. Any adequate physics of the future will *certainly* entail the existence only of things objectively similar to today's elementary particles. By "matter" we mean "something objectively similar to what physics today says there is". I did not ask the obvious next question.

Perhaps, if I were persuasive enough, I could convert all these friends to the postmodern stance I described above. Then my story would be true of them too. It might not be an act of charity, given the often debilitating scepticism, the doubts, the sense of meaninglessness to which it makes me pray. Never mind charity! After all, I came to this stance through experiences that I genuinely and authentically view as significant. I believe that I learned in this hard school of life: from the wars, from arguments, from novels, eyewitnesses, and philosophical

debates. Surely it is always charity, however painful, to show someone the truth? So if only I could believe that what I learned was the truth – that the postmodern story, of what we are now, of the insights we have so painfully gained, is not just a story about us, but true...

In that story, I am a postmodern hero/anti-hero, beyond tragedy and comedy, having come from suffering through reversal to recognition. That gives me pause: I see all the telltale signs of narrative and dramatic structure, enough to undermine it. To my dismay I regress to another hero type: Hamlet, unable to maintain hold onto his own beliefs, one who cannot evangelize because he can find no firm faith within himself. This is the end of my story, or rather its ending, which also belongs to the story: here we are.

How did we end up here, and to what extent did we – as Hamlet did – lose our courage to the specters of a dead past and conflicted desires of our present?

2.

Let me continue with an older story: a story I can tell about ideas from Bacon to Descartes – a narrative depicting one origin of our current views.

Bacon, prophet of empiricism,[3] is frustrating as any prophet. Scourge of the old, the superstitions and idols of the past; harbinger of the new – but the new he preaches seems to our eyes already flawed by his own critique of the past. Knowledge is to be firmly grounded in experience Didn't the ancients, and their medieval followers, already understar that there is nothing in the mind that was not first in the senses? Yes, tl main tradition he castigates saw knowledge as firmly rooted i experience. But by their own testimony, they leaped from experience to theory, and then let experience live only as instantiation thereof. "For the ancients themselves openly avowed the form of their inquiry...: out of a few examples and particulars, with the addition of common notions... they flew to the most general conclusions or principles of the sciences, with respect to whose fixed and immovable truth... they extracted and proved inferior conclusions..." (*Novum Organum*, I:125) True to the main empiricist theme, Bacon calls us back from theory to experience. Moreover, he does so in the name of truth, or of the search for truth, the professed goal he has in common with those he criticizes:

> this very thing [...] is what I am above all concerned with. For what I am establishing in the human understanding is a true model of the world, as it is found to be, not what anyone's reasoning shall have dictated to him. (*Novum Organum* I, 124)

[3] I use "empiricism" in its current sense, not Bacon's; see *Novum Organum*; I: 95.

His critique should give us a good clue to what he advocates instead. Does it?

The treatment of experience which Bacon criticizes is first to abstract universal principles from a few instances encountered in experience, and then, secondly, to experience new phenomena simply as instances of those principles. In that second stage one treats new phenomena, by hook or by crook, as already classified and understood: "then, if any new particulars and examples were brought forward which would conflict with their opinions, they subtly fitted them into their system by distinctions or explanations of their rules, or else crudely removed them by provisos...; while for any particulars that were not conflicting, they labored long and hard to find causes that agreed with their principles" (*Novum Organum*, I: 125). That is a critique of the second stage; but what exactly is the (presumably more creative) first stage?

Abstraction is from something; it is typified by the replacement of a very detailed description by one which is short, simple, and general. So abstraction is possible only if the initial experience already produces a text, examples of things understood in a preliminary way. Abstraction unifies: whereas before there was a great diversity of descriptions, now there are only a few types (*Pig*: tame, wild, and guinea; *Lion*: land- or sea; *Hund*: Wind-, See-, oder Dachs-; etc.) Once those categories are established, their typology partitions the world encountered. Experience, schooled in its use, consists in pigeon-holing alone.

We can understand Bacon's dismay at this form of science and education. We guess at once that he will ask us to somehow delve beneath all learned categories, to recapture experience as it is (or was) prior to that promiscuous schooling of the mind. But that is not what he does at all. He does extend his critique into a veritable cry at the sickness of our language:

> For while men believe their reason governs words, in fact, words turn back and reflect their power upon the understanding, and so render philosophy and science sophistical and inactive. For words are usually applied according to common comprehension and divide things along lines most suited to common understanding. When someone of sharper understanding or more diligence in observation wishes to shift those lines, so as to move them closer to Nature, words shout him down. (*Novum Organum*, I: 59)

So does Bacon then suggest a radical grounding of science in pre-verbal experience? He does not. Perhaps, we think today, he would have been very ill-advised to do so. But in that case, just what was his critique meant to show?

Bacon the prophet advocates – it is hard to see it otherwise – the very method he decried, with cautions to apply it more carefully and self-critically: to do the same thing, only better. We must become educated,

literate experiencers, able to read the Book of Nature (*Advancement of Learning*, I, vi, 16); indeed, to read it as God wrote it, and not read our own fancies into it. The passage about "a true model of the world" is followed by: "Men must realize... how great a difference there is between the idols of the human mind and the ideas of the divine mind. The former are no more than arbitrary abstractions: the latter are the Creator's true stamp upon created things, printed and defined on matter by true and precise lines" (*Novum Organum*, I: 124). Here we find Bacon, scourge of scholastic realism, embracing the very realism that justified intuitive abstraction as *not-arbitrary*. The forms abstracted are the true natures; abstraction "carves nature at the joints".

Yet, as the scholastics had realized, that justification needs another premise. Not only must those "true and precise lines" be there, but the mind must be capable of discerning them. Bacon supplies no basis for this premise beyond faith in human progress: we can learn to discern those lines correctly, as children learn to read in school. The lines I quoted as epigraph at the outset come in a passage which at first sight looks quite banal: an injunction to write down the deliverances of experience systematically, in "tables of discovery". But the phrase "literate experience" echoes much more intriguing passages elsewhere. In *De Augmentis Scientiarum*, Bk. V, Ch. II, Bacon speaks of Literate Experience (*experientia literata*) as "a kind of sagacity", "the chase of Pan".[4]

Literate experience is there described in a small manual for the experimental method. Once the inquirer achieves the literate form of experience, then, and only then, are the methods of the *Novum Organum* properly available to him. Only then is he no longer blundering in the dark. For then "it is as if he were led by the hand; and this is what I me by (Literate) Experience" (*Works*, IV: 413).[5] This passage echoes t beginning of *Novum Organum* (though these echoes may mask serio tensions between the two).[6]

[4] The phrase "experientia literata" is variously translated as "literate experience", "learned experience", "instructed experience", and "informed experience"; I shall use the first. Compare *Works IV*: 407, 413, 421; *The Physical and Metaphysical Works of Lord Bacon* (Tr. ed. J. Devey. London: Henry G. Bohn, 1856): 183, 188 and Stephen H. Daniel (1990), who uses an earlier edition of Works; Jardine (1990), who prefers to keep the Latin. The "Book of Nature" metaphor, to which this phrase so clearly relates, was common. Bacon uses the metaphor in *Advancement of Learning* (I, vi, 16); besides its most famous use by Galileo it is found e.g. earlier in Paracelsus and later in Boyle, to mention just a few.

[5] The edition I've used is: Francis Bacon, *The Works of Francis Bacon*, Ed. J. Spedding, R. E. Ellis, and D. D. Heath. London: Longman and Co., 1857-1874, in 14 vols. eissued Stutgart: Frommann-Holzboog, 1986.

[6] Jardine (1990: 60) argues that in the method of Induction of the *Novum Organum* Bacon offers one solution for the problem of uncertainty (contra the sceptics) and i Literate Experience another. The two are rival solutions pursued simultaneously, and sh concludes "It is not surprising, then, if Bacon suffers in the secondary literature from a acute case of split personality ....".

In this phrasing we may spy the admission which our anachronistic eyes have been looking for from the outset: reading is interpretation, and literate reading is educated interpretation. The method Bacon advocates, and which he means to spell out in detail in later parts, is a method for the Interpretation of Nature – but, we say today, interpretation leaves leeway, interpretation is not unique.

Bacon can hardly have missed this leeway, though "interpretation" always had (and always connoted till recent doubts eclipsed it) the primary sense of uncovering and revealing what is truly there but hidden. Bacon's words seem deliberately chosen to deny the leeway and the doubts. "[S]ince my method of *interpretation*, once the history has been prepared and put in order, addresses not only the operations and discourse of the mind, as common logic does, but the nature of things as well, I therefore so guide the mind as to enable it to apply itself to the nature of things in every appropriate way. And for that reason I propose many different rules in the doctrine of *interpretation*" (*Novum Organum*, I: 127). It is mostly bluster. *Novum Organum* appeared in 1620. That no experience, nor even any systematic record of schooled, literate experience, is immune to alternative interpretation was clearly and distinctly perceived by Descartes not much later in the same century.

In Part IV of his *Principles of Philosophy*, Descartes faced up to a disturbing possibility. No matter how well his theories fit the observed phenomena, other theories might do equally well:

> But here it may be said that although I have shown how all natural things can be formed, we have no right to conclude on this account that they were produced by these causes. For just as there may be two clocks made by the same workman, which though they indicate the time equally well and are externally in all respects similar, yet in nowise resemble one another in the composition of their wheels, so doubtless there is an infinity of different ways in which all things that we see could be formed by the great Artificer [without it being possible for the mind of man to be aware of which of these means he has chosen to employ]. (*Principles of Philosophy*, IV: 204)

Descartes tries out several responses. He begins with the line we now call anti-realist (contrasted with scientific realism) to the effect that science does not aim for the truth. Science has a lesser aim: to obtain the truth only as regards the observable phenomena, and to show, through its theoretical story (which exhibits mechanisms "behind the scenes") only how the phenomena *could possibly* be the way they are. This, he notes with a little effrontery, is just what Aristotle said at one point in his work on Meteorology: "that with regard to things not manifest to the senses, he considers that he supplies sufficient explanations and demonstrations of them, if he merely shows that they may be such as he explains them to be" (*ibidem*).

But Descartes could not rest with this response. Perhaps it occurred to

him that, whether the proffered explanation of phenomena so far will fit all phenomena (future and elsewhere as well), is also dubitable and for similar reasons. Considerably more astute with respect to epistemology than Bacon, not only in how he sees the problems but in espying possible solutions as well, Descartes offers a second response. The next Principle begins "*That nevertheless there is a moral certainty that everything is such as it has been shown to be*". What is this moral certainty? It is a certainty "which suffices for the conduct of life, though if we regard the absolute power of God, what is morally certain may be uncertain". This moral certainty we can claim for such a successful science as we have today: " they who observe how many things regarding the magnet, fire, and the fabric of the whole world, are here deduced from a very small number of principles, although they considered that I had taken up these principles at random and without good grounds, they will yet acknowledge that it could hardly happen that so much would be coherent if they were false" (*Principles of Philosophy*, IV: 205) (Two centuries later Darwin, would write, in unconscious echo: "It can hardly be supposed that a false theory would explain, in so satisfactory a manner as does the theory of natural selection, the several large classes of facts above specified" (*On the Origin of the Species*: 476).

How can Descartes possibly support this? As did Bacon, he has recourse to the idea of literate experience, of experience as reading – and indeed, as reading a text with authorial intention to give it meaning. The "alien clock" image gives way to the image of a cypher or code:

> if, for instance, anyone wishing to read a letter written in Latin characters that are not placed in their proper order, takes it into his head to read B wherever he finds A and C where he finds B, thus substituting for each letter the one following it in the alphabet, and if he in this way finds that there are certain Latin words composed of these, he will not doubt that the true meaning of the writing is contained in these words, though he may discover this by conjecture, and although it is possible that the writer did not arrange the letters in this order of succession, but on some other, and thus concealed another meaning in it: for this is so unlikely to occur [especially when the cipher contains many words] that it seems incredible. (*ibidem*)

There speaks the faith of common sense and practical prudence! But Descartes has let the cat out of the bag, he has confronted the essential problem, has brought it out into the open, and nothing he can say will make it go back in again. Interpretation has leeway; interpretation is not unique. Once it is admitted that interpretation is a crucial part of natural inquiry, there may still be objective truth, there may still be a "fact of the matter". But it becomes an open question whether this truth about "the things our senses do not perceive" is reached – or even, whether the aim of reaching it, and the aims of practical life served by the sciences, really coincide.

So here is our predicament, clearly prefigured in the 17th century. For both Bacon and Descartes, nature is a text full of meaning bestowed by authorial intention. The natural philosophers of that century agreed to an "ethic" of inquiry: God and revelation could not be drawn on to bridge any "little" gaps in scientific reasoning. But they could be drawn on to give overall coherence, in philosophical commentary, to views that are rapidly turning from literal metaphysics into metaphors and then into distant analogies beset by disanalogies. Cyphers and texts without authors are not cyphers or texts, though it may be of practical advantage or intellectual interest to treat them as texts. Reading the book of nature becomes indistinguishable from reading into nature. The Interpretation of Nature announced as *Novum Organum* becomes an instance of the pathetic fallacy...

3.

Science, indeed all natural knowledge, is answerable to experience, and (fundamentally) to experience alone: that is its bottom line. But the experience in question is literate experience: informed, learned, able-to-read experience. Thus all reflection on reading, all literary theory and literary criticism, is *ipso facto* relevant to our reflections on science. To mobilize this insight, two more preliminaries are required. We need to take a close look at experience, trying our best to see it clearly through the fog of failures and successes of modern empiricism. We need secondly to discern the relevant structures of text and reading, which might possibly be shared by nature and (literate) experience. Having looked at both separately, we may be able to discern the illuminating parallel, if there is one.

4.

Literate experience is experience which takes the form of reading – reading the Book of Nature. That is possible only for someone who has learned the language in which that book is written: the language whose letters, syllables, words, sentences, and paragraphs are the natural, observable things, events, and processes. I say "the language"; but as Descartes'cypher shows, we must admit that the same "inscription" can be different words in different languages, that is, relative to different coding schemes. Therefore it would be more accurate to say "a language" – and there is a new rub.

It is certainly possible to learn such a language.[7] For a person who has

[7] Some would say that this is just what happens when we learn our native language at our mother's knee. But I feign no psychological hypotheses.

been made literate in this sense, all seeing is reading. If he sees the letters A, R, T arranged on the page in a certain order, he reads the word "rat" (or "art", or "tar", depending on that order). If he sees a rat, he also "reads" the word "rat" – the natural object has become for him a different inscription of that same word. He has been conditioned to respond to his experience of a rat with the observation report "Lo, a rat!" In the same way he can learn to respond spontaneously to the sight of fire with either "Lo, fire!" or "Lo, phlogiston escaping!" or "Lo, oxidation!" That depends on *which* language he has learned, in which to read nature.

The history of science gives us examples of alternative ciphers, (to continue with Descartes' image) contrary to Descartes'intention: we no longer insist on moral certainty that we have reached the *correct* understanding as soon as we have found *some* code in which the text makes sense. Those different languages in which we can read nature are languages of theories – the phenomena make sense when reported in a given language as long as the embodied theory works, and to the extent that it works.

Empiricism, seen in retrospect, engages in a recurrent flirtation with the idea of illiterate experience. Before all theory there must be experience not infected with or shaped by theory – surely (?) – and *that* is the bedrock of knowledge and rational opinion. This idea, like the associated idea of induction (a.k.a. the way to go beyond illiterate experience to theory) is reborn in every philosophical generation, and each time goes to its usual, by now somewhat boring (let alone predictable!) defeat. Given the hardy, persistent recurrence of that flirtation, however, we can't discuss experience without taking a look at its putative illiterate, primitive, pristine or hygienic, form.

Let us first try to make a good case for the ideal of illiterate or preliterate experience. We begin with our usual sort of experience which is literate, in that we are clearly responding with formulable judgments. I walk into the garden and see a flower (tree, flying saucer, what have you) and I think something like "There is a flower" ("a tree", "a flying saucer", as the case may be). This judgment may be true or false depending on what there is in the garden. But even apart from that, surely, the words may accurately or inaccurately express how it seemed to me, even if it was not really that way. I may have to correct myself and say later "There was no flower there, only a candy wrapper stuck in the grass. But what I thought was still accurate in one sense: I did take that candy wrapper to be a flower, it looked to me like a flower, it seemed to me that I saw a flower". In that case, the judgment was not true to the facts about the garden, but it was still true to something – something very private, a little display on a mental stage, an image visible to (or I should say, haveable by) me and only me. There you have it: that *something* is the stuff which there must be prior to and independent of our judgment, our literate response. Because that something is there, literate experience is only a

combination of experience in the pure, private "given" sense plus an accompanying literate response.

This conclusion is wrong, or at least entirely unwarranted. As I told it just now, the story involved one of those subtle lapses into reification that so easily make metaphysical realists of us all. The insight correctly brought to the fore, which must be saved, does not support the reification of private dramas on a mental stage. Look again at this judgment "There is a flower". It may be true or false, depending on what there is in the garden. Regardless of whether there is a flower there, the judgment may be accurate or veridical in another sense: it may be so, indeed, that at that moment there seems to be a flower in front of me. If the judgment is spontaneous and immediate, it follows that it is accurate in this sense – for what else does *seeming* mean?

But we can stop here, *before* we add that there must be something of which, to be accurate or correct in this sense, the judgment must be true or to which that judgment must correspond. Motives for such an addition would have to come from a theory about judgments, veridicality, and correspondence – some philosophers' creation, which we need pay no heed. When it comes to experience as ordinarily discussed, nothing requires such reification of private mental occurrences. But it may take some purging of old philosophy to see that. Let us first remind ourselves of Wittgenstein's insight about mental imagery, and then try to describe experience in ordinary, non-theoretical terms.

The item in front of us can be seen, so to speak, in different ways. It is a candy wrapper; I see it as a flower. Certain drawings make us acutely aware of this ambiguity: the duck-rabbit picture is a stock example. The idea of a mental image comes in as part of a rudimentary theory to account for this. When I see the candy wrapper – so the theory goes – I form or have a mental image; and this may be a candy wrapper image or a flower image. My judgment "There is a flower" may be "true-to" my mental image even while it is not "true-to" the real thing, which is not a flower after all.

For this theory to do its job properly it must remove the ambiguity; that is, the mental image must not be ambiguous in the same way. That mental image must not be graspable (or whatever be *le mot juste* here) in multiple ways, on pain of a useless regress. But, Wittgenstein pointed out, *then it is not an image*. For images, real images of every sort, are in this respect in the same boat as candy wrappers. (The duck-rabbit picture, for example, is a picture, and it is an example which shows clearly what real images in general are like.) Unfortunately the theory derives all its strength and appeal from the simpleminded positioning of an image between me and the candy wrapper, and yet will not work at all if we take seriously that the postulated entity is indeed an image. So the theory isn't any good at all. Let's now try for a better account, closer to what experience is really like.

Certain events happen to us, and we are aware of their happening to us. These are our experiences. As they happen to us, we respond in a variety of ways; one way is with judgments concerning exactly what is befalling us just then. An example will make this concrete and also introduce a crucial distinction.

(1) Ric O., a mountaineer, returns to civilization and sees a newspaper for the first time in seventeen days. The headline proclaims "Ric O. has won one million dollars in the state lottery". He exclaims "Oh my God! I've won a million dollars!" Many years later he tells his grandchildren that he once had the experience of returning from the mountains to find that he had won a million dollars.

(2) Ric O., a mountaineer, returns to civilization, but has amnesia. He sees a newspaper with the headline "Ric O. has won a million dollars". The name sounds familiar to him and he explains "Look! Ric O. has won a million dollars!"

The first point to note is, of course, that in these two scenarios, the same event happened to Ric O. and he was aware that this event was happening to him. But in the second scenario, it is deceptive or misleading to put it that way, for his response does not have the requisite first person form. He does not have the experience of winning a prize, because he does not "self-attribute" the property in question, even though he does attribute it to the right person.[8]

There is a second important point. The event, his experience of winning a million dollars, is entirely public. It is not a private drama on a mental stage, accessible only to Ric O. Certainly, we can't conclude that he had the experience in question unless we know the form of his response (first person judgment? self-attribution, self-location?), but what happened to him is a publicly observable event. The judgment may be made either out loud or sotto voce (as all reading can be done either way) but *that* is hardly crucial to the question whether or not he had the experience.[9]

[8] The literature on this subject in analytic philosophy has been growing steadily; for a sample, see Castaneda 1966, Perry 1979, Lewis 1979, Seager 1990, and Van Fraassen 1992.

[9] I say there are no private dramas enacted on mental stages, somewhere between me and the publicly accessible world. You may reply that then it is fine to stick me with a pin, because obviously I never have pain or pleasure. Such a reply would be predicated on the philosophical view I oppose. The pin would hurt, and I would feel pain. But feeling pain is only *verbally* like feeling a toe in my sock. The denial of some separate domain of entities only contradicts a philosophical theory, a particular philosophical account of what we all agree on. Similarly, in the flower example above, I would not deny that (quite possibly) I will be the only person who will ever know that I initially took the candy wrapper to be a flower. That really happened; I remember it, and perhaps I never told anyone. It does not follow that there is a mental entity whose image resides in my memory – except metaphorically

Nowhere in this story do we see allusion to some further event, an "illiterate" experience which is distinct from (in between?) what happened to Ric O. and his literate response. A psychologist might wish to postulate such an intermediate event, or construct a model with many hidden parameters. Philosophers have no business doing so; philosophers should not be armchair psychologists. If they are, their every hidden variable is a red herring, a snare, and a deception.

5.

Let me, for the moment, blur the distinction between literary and everyday texts as well as the difference between texts as images of the world and the natural world as (according to a venerable tradition) a Great Text to be deciphered. (Eco 1992: 25)

Do the techniques of literary criticism apply to the Book of Nature, or its readings? Our second preliminary inquiry, before broaching this question, must concern literature and its theory. My scope will be relatively narrow here; I will mainly look at the ideas of Umberto Eco. In traditional terms, it may seem a little absurd, or a bit precious, to suggest that literary criticism could be responsibly made relevant to the study of nature. (Recently scientists have in fact been protesting mightily against certain sorts of attempts to do so.)[10] For the metaphor of the Book of Nature cannot bear much weight once we cease to think of natural inquiry as inquiry into the Mind of the Maker. What is left even of the Book metaphor, when Book is abstracted from Author?

The question just posed is rather at odds with the newer approaches to art and literature. As posed, it presupposes that the meaning of a book or artwork must lie in the intentions of the author/creator. While that view has not been entirely abandoned, it has mostly given way to reader/viewer-oriented approaches. One seminal idea here is Eco's concept of the open work, which does not uniquely dictate its own interpretation but calls for creative activity on the reader's part. Writers and artists themselves, especially in our century, have been quite insistent

speaking. On the other hand, my denial of a realm of mental entities does not imply advocacy of materialism, at least not in any worthwhile sense. What I advocate here is philosophical hygiene, not revisionary metaphysics of any sort.

[10] As I am writing this (spring 1996), physicist Alan Sokal has just had great fun publishing a parody of "literary" discussion of physics in a special issue of the journal *Social Text* and then exposing his own paper as a hoax in an interview with *Lingua Franca*. Stanley Fish wrote an (almost subtly) scathing response in "The New York Times" (May 21, 1996). I hope it will be clear to those familiar with this controversy that I am an advocate for neither side and that the relationship I wish to pursue – between literature or art on the one hand and natural science on the other – is very different from their topic of concern.

that the creator's intention is not the touchstone or criterion of adequacy for how the reader/viewer understands the work.

But is there any constraint on interpretation? Of course there is; we must have room for evaluative judgments upon reading. The character of such evaluation is not simple, but needs to be explored in detail and at length. Here too Eco contributes a wealth of insight, to distinguish the use of a text (e.g. to stimulate or satisfy prurient interest or desire for information) from proper reading. Interpretation is to be distinguished from such use on one side, and from over-interpretation on the other. But if the intention of the author does not anchor those lines of demarcation, what does? This brings me to the most intriguing (and for my present topic, the most relevant) part of Eco's literary theory.

In recent writings Eco has suggested that there is something to be found between the intention of the author and that of the reader:

There is an *intention of the text* [....] (or *intentio operis*, as opposed to – or interacting with – the *intentio auctoris* and the *intentio lectoris*). (Eco 1992: 25)

If useful anywhere, this idea should apply in "practically" author-less texts. Eco's recurrent example is the message in a bottle washed up on the strand, but Sumerian tablets come to mind as well. As I shall explore below, the Book of Nature, if that metaphor is to be honored at all, must be our example *par excellence*.

If there be no author's intention, how can there be any constraint on the reader's interpretation at all? The obvious and perhaps sole candidate for another source of constraint must be some character of the text – its meaning or structure or whatever else it may have autonomously once it leaves the parental author's home. Textual strategies, present in the text itself, have a function: to draw the line between interpretation and over-interpretation without recourse to the author. Unless the text has its own structure, prior to and independent of our reading, then truth will come too easily, too cheaply, to any and every consistent story readers could tell. For without its own structure, its internal "textual strategies", the objects of interpretation will resist nothing, allow everything.

The text's relevant structure, however, cannot very well be thought of as independently there, like the chemical constitution of its ink and paper. In a world devoid of conscious beings, wind and water might trace the shape "Coca Cola" in the sands, but there would be no text in that world, nothing would mean anything. While I hope that the parallel problem for the interpretation of nature is by this time constantly nagging at your attention, we can make one point possibly peculiar to the primary case of literature.

Texts are artifacts. The *intentio operis* is the structure to be discerned in an artifact. Its origin can be attributed (even if, for many critical purposes, not relevantly) to social, cultural, and psychological factors present in the text's making. The language in which it is written is the

language of a people in a certain historical period, not created specially and *ex nihilo* by the author. Thus, leaving the author out of account does not remove the basis for attributing structure to a text. So it is not absurd to attribute structure to a text which resists reading, while leaving the author out of account.

Eco recognizes the difficulties that beset discernment of a separate intention of the text, distinct from any intention of the "empirical" author. The text creates its own model reader; the empirical reader – you or I – play-acts the role of model reader and listens to the voice of the model author (a textual construct) who presents that reader with a meaningful story – with *what the text says*, the meaning of the text. Clearly the role of the reader has not been diminished here, but serves to bring out the problem more clearly:

> I am trying to keep a dialectical link between *intentio operis* and *intentio lectoris*. The problem is that, if one perhaps knows what is meant by "intention of the reader", it seems more difficult to define abstractly what is meant by "intention of the text". The text's intention is not displayed by the textual surface. [...] One has to decide to "see" it. Thus it is possible to speak of the text's intention only as the result of a conjecture on the part of the reader. The initiative of the reader basically consists in making a conjecture about the text's intention. (Eco 1992: 64)

This is valuable: the intention of the work is something discernible in the work, but not something that exists independently of the reader's role. To clarify this, we should distinguish two senses of "conjecture". In its primary sense, this word carries a presupposition of possible truth or falsity – that is, of something which is thus or so, the thing about which the conjecture conjectures. For example, I conjecture that the empirical author of certain plays was, in fact, Francis Bacon, and I am right or wrong.

To illustrate the second sense I'll refer to recent philosophy of science. When realists and anti-realists alike agreed with Popper that scientists engage in bold conjectures, a second sense came into play. *Conjecture* can be taken here as model construction, offered as fitting the phenomena, but possibly having no standard of correctness (or no *relevant* such standard) beyond that. Bohr's bold 1913 conjecture consisted in presenting a model of the atom. His own later reflections suggest that this model needs not have described a true reality, but only have fit the observable phenomena, to be good, even for its own time. Looking a little further down the page, it seems that Eco's "conjecture" bears that second sense:

> A text is a device conceived in order to produce its model reader. [...] The empirical reader is only an actor who makes conjectures about the kind of model reader postulated by the text. Since the intention of the text is basically to produce a model reader able to make conjectures about it, the initiative of the model reader consists in figuring out a model author [...] that, in the end, coincides with the intention of the text. (*Ibidem*)

The methodology is becoming very interesting! For the intention of the text is now clearly seen *not* as a pre-existing structure, but dependent on the reader's role.

The reader reads the text in a language. Initially at least, the reader's reliance on his own language will and must be uncritical, until serious tensions develop. In this language the text is often resistant, recalcitrant, viscous, hard to penetrate. The reader's role is not an easy one. (This too is true of nature; I shall argue shortly that the resistance there too can be understood a-metaphysically.) Eco gives as example that the *Imitation of Christ* cannot be read as written by Céline. Too much of the book *resists* that reading. To understand that, we need not postulate some structure in the text which guarantees a uniquely right conjecture/interpretation. It is sufficient to note that the textual surface, though not simply displaying the meaning, consists of specific words which resist many such conjectures even if not dictating precisely *one*.

The model building role of the empirical reader requires him or her to remain responsible to the textual surface, to accept accountability. That is the first requirement: to accept responsibility for saving the phenomena. This does not imply a simplistic methodology, such as would be suited to searching a desert island for pirates' treasure:

> Thus, more than a parameter to use in order to validate the interpretation, the text is an object that the interpretation builds up in the course of a circular effort of validating itself on the basis of what it makes up as its result. (*Ibidem*)

The here acknowledged hermeneutic circle is as characteristic of scientific inquiry in general as of textual studies. Eco rightly cites Augustine's *De Doctrina Christiana* for the check upon interpretation, predicated on resistance by text. Respect for the text's own character requires us to preserve the coherence of the text as a whole, a constraint which can be fulfilled in many ways but nevertheless derives merely and simply from the text's being thus or so, and not otherwise.

My sketchy presentation does scant justice to Eco's subtle doctrine. It was Eco's hope to isolate constraints that allow, for an open work, a plethora of interpretations and yet not just any interpretation whatsoever. The *intentio operis* is a character of the work itself, and a reading ideally takes the form of an admissible conjecture of that *intentio*. Admissible such conjectures are interpretations properly speaking, the rest are cases of over-interpretation. But "admissible" does not mean "conforming to something that exists in the text independently of the readers'activity".

What exactly it does mean in the case of literary works I shall not explore further here. It is time to explore this same hope, if possible, for the suggested parallel of the Book of Nature.

6.

Literate experience equals reading the Book of Nature; to be able to read nature, experience must become literate. Thus the metaphors line up. Very well, but nature so conceived is to be treated, in the context of an autonomous science, as text without author. The seventeenth century already pledged itself to ignore the Author in natural science. This was not, ostensibly, to profess unbelief, but to impose discipline upon the science. Either account for natural phenomena entirely in natural terms, or be silent! Or at least, leave reflections on the Divine to your Scholium, respecting the proper boundaries. Thereafter the "bracketed" part of the metaphor became ever less substantial, and has largely dropped away altogether. Anyway, perhaps we might as well assume that Book to have been written by no author at all, given the many readings to which it has been subjected!

So: where is the idea of *intentio operis* more needed? If there be no author's intention, how can there be any constraint on the reader's interpretation at all? In reiterating the literary question Eco faced, in these terms, we pose the nominalist's impasse, and thereby, the single great argument for metaphysical realism. Let me try to explain this medieval issue in more or less contemporary terms, for it is still very much alive today in academic philosophy. Metaphysical realism is a solution to the "text without author yet with meaning" problem as posed for the natural world.

Science begins and ends with taxonomy. Phenotypal similarities suffice initially to distinguish such real categories as mouse, human, and mammal from gerry-mandered classes such as human-or-mousekind, which is not *real*, though well defined. Similarity, however, is a treacherous relationship. (Hermetic semiosis, based on similarity, is Eco's historical paradigm of over-interpretation.) Scientific theories provide new bases for classification. Common origin is one: all mammals have hair, but more importantly, all mammals share an ancestry not shared with birds or fish. Deep structure is another: different metals may look the same but differ in their molecular or atomic structure; the difference may become manifest in observable behavior only under very special circumstances.

But each taxonomy is only one possible partition of the world, based

on the choice of some classifying principle. In the case of scientific taxonomies we can plead their importance on the basis of use and usefulness for practical human ends. Taxonomies based on phenotypic similarities are less fruitful sources of prediction than those with which science replaced them. This instrumentalist reflection often does not satisfy, and is sometimes seen as just missing the important question. The metaphysical realist says that first of all, some taxonomies are "correct" in that they "carve nature at the joints" while others use arbitrary, unnatural, gerry-mandered classes. This distinction must have a basis in nature itself. Secondly, s/he says, any classification can be correct only if there is in the things classified some real basis for demarcation (even if recondite). That basis must be something in the things, not the things themselves; it must be properties, attributes, Universals, Relations – in short, real structure present in the things. The two required bases for classification – for classification *überhaupt* and for the natural/unnatural distinction – may be the same, if e.g. there is some hierarchy of Universals, with some simpler or more basic than others. Someone looking for theological precedents may think of roles, status, ranks, and laws constituted for the things in this world by Divine decree. The metaphysical realist holds that the structure must be there even if divinity be missing, to "ground" classifying judgement, whether of the everyday or scientific variety.

So here we have it: the counterpart in nature of the *intentio operis*. That *intentio*, in the case of a literary text, constrains interpretation and demarcates interpretation proper from over-interpretation. Exactly thus, the role of objective structure, real properties, structure defining attributes (the medievals' Universals and our contemporaries' as well): to constrain description of nature.[11]

But there is a clear difference between this realism and Eco's doctrine. The metaphysical realist insists that the structure is there independently of any judging, classifying, or "reading" activity. No dialectical, logical, or internal relationship binds them: correct classification is classification that corresponds accurately to the structure of nature itself, which structure it would have even if there were no classifiers or classifying activity. Despite the similarity in *problématique* and form of solution which I noted, the emphasis is all on the disanalogy. Recall our previous

[11] This is the traditional objection to nominalism, the view according to which only concrete individuals (not abstracta, properties, or Universals) are real. The late 14th century nominalist revolt at Oxford and Paris effectively destroyed the medieval Aristotelian tradition from within, and initiated modern science — this is the historical episode so effectively dramatized in *The Name of the Rose* whose William of Baskerville is, philosophically, William of Ockham with a tinge of Roger Bacon.

example: if in a universe devoid of conscious beings the wind or rivulets of water trace a pattern in desert exactly like an inscription of our words "Coca Cola", that is not an inscription of any words at all. The division of natural features into words (in the sense of meaningful texts) and non-words makes no sense for a world devoid of consciousness. Not so with the division of metals into iron, gold, lead ..., of powdery substances into snow, sand, dust ..., and into white, grey, yellow .... Those divisions make equal sense for a world happily bare of classifiers and describers, scriveners, thinkers, and speakers of any sort. Indeed, if it were not so, then neither reading nor classifying would have a way to get "off the ground" for they presuppose a background of independently structured material substrata. So says the metaphysical realist.

7.

Can we resist realism, and attribute structure to the natural world in closer analogy to Eco's *intentio operis*, bound in a hermeneutic circle to the *intentio lectoris*? To put the matter more simply and less imbued with theory: can we attribute structure to nature, sufficient to constrain interpretation, without adopting a metaphysical realist position? Can we learn from the interpretation of texts, and the forms of its possible constraint, how to be nominalists without demoting natural science to *mere* story-spinning? We will have to say that on the one hand nature's structure is not independent of the reader's creative activity; on the other hand, nature, like any text, resists reading and does not lend itself to just any interpretation that anyone might invent. The former point rejects realism, the latter keeps the nominalist's feet on the ground. How can this guiding idea be carried through?

The crucial clue is exactly the literacy of relevant experience. That experience, in the role of touchstone for knowledge, science, and reasonable opinion must be literate experience, in the sense explored above, entails the required analogy to the resistance of the text to over-interpretation. Why does *The Imitation of Christ* resist reading as a text written by Céline? Because it is written in a language which is the common property of its readers, it was created in a medium of which we readers have some pre-understanding. While that language has much leeway, vagueness, malleability, readers can evaluate their own and other readings as close or closer to text, for the malleability is, though infinite, still bounded. Our common pre-understanding of the medium is something to which we are accountable, in any responsible reading. Now, since experience is literate, and must be literate in some specific way if it is to be a "reading" of nature, we encounter the same resistance there. We already have a certain pre-understanding of the phenomena we

investigate, residing in the common language that we own not individually but communally and in which are couched our spontaneous responses to what happens to us.

Let's admit at once that the given language in which we start is not a structure etched in stone – one form of response open to us, especially when we run into difficulty as we try to make sense of it all – is linguistic innovation. That is perhaps the main place where to locate the circle in this hermeneutics: we are strictly accountable to our pre-understanding of the text or "text", but we can also change the terms in which that pre-understanding is couched. However, such changes are not easy or cheap. Much resistance must already have been dealt with responsibly before such alterations are in order or even possible.

To explain nature's analogue to resistance to reading, and show that it need not be attributed to the presence of Universals but can be understood in this different way, I will begin with the nominalist core position on truth. Consider such simple statements about nature as:

> Snow is white.
> Magnets attract iron.

The realist suggests that these cannot be true unless there is real structure in nature, independently of us. For example, he suggests, there must exist a real Universal *whiteness* in addition to the snow, and snow must instantiate that Universal for "Snow is white" to be true. (Similarly, there must exist a real Relation *attraction*, which magnets and bits of iron must instantiate, for "Magnets attract iron" to be true.)

This is not so.[12] What is needed for "Snow is white" to be true is simply that there really be snow, and that it be white. That is enough to ensure also that all the rival statements will be false: "Snow is black", "Snow is puce", and so forth.

The point made may sound so simple as to be merely verbal. But it has to be simple. If anything could save us from the slippery slope into metaphysical realism, it must be a point so simple, so fundamental as to be close to a truism. The fallacy pointed to must lie at the very outset of our thinking, it must be a pitfall dangerous exactly because too easily overlooked; and avoiding it, once seen, must be as easy and natural as slipping into it when not seen.

[12] This is only the clearest lesson of Quine's "On what there is".

Now if the description of nature needs no real Universals, Relations, or other inherent structure, will every description fare equally well? Definitely not – for it is not a trivial, easy feat for snow to be white; it rules out a veritable continuum of possibilities. Snow resists being seen as black or puce; the iron filings rushing toward the magnet resist being perceived as keeping their distance. It is exactly this resistance to reading that spells the downfall of erstwhile successful theories. The phenomena of combustion, at first so easily read and accommodated in the language of phlogiston accrue and multiply during our probing and begin to resist that language. By and by the phlogiston theorist feels he is walking in molasses or lost in a morass.

The structure discerned in nature: what exactly is that, if it is not something real in addition to the snow, the iron filings, magnet, fire, and so forth? That is an awkward way to ask the question, as if caressing the idea of structure with one hand while brushing it off with the other. In a minimal sense, we do attribute structure to nature whenever we describe it. There is a sense of "attributing structure" which implies no more. In this minimal sense, to say that nature resists certain forms of reading, of literate experience, is to attribute properties, characteristics, and structure. Metaphysical realism slips from this minimalist sense into substantive postulates. This slippage is what we must resist. We resist it by making a point which unashamedly rests on the literacy of experience, exactly because it unashamedly relies on our own language while discussing the truth of judgments we make in our own language. That "Snow is white" is true exactly if snow is white (without furthermore) is itself a judgment open only to us who tacitly acknowledge every word in that equation as being in *our* vocabulary.

Texts would have no resistance to reading if not written in a language. That is, considered as complex shapes, which we may regard as arbitrarily cut fragments of any possible language whatsoever, they are subject to no constraint on interpretation. Similarly for natural phenomena: if not subject to a preliminary description in the language we have already, to which we are initially strictly accountable, they neither conform to nor violate any theory, and equally, neither can they be seen as conforming to any.[13]

Let us take stock for a moment. How far have we come? If I am right, we can attribute structure to nature in a sense which does not commit us to metaphysical realism, yet does not imply that any and every

[13] Hilary Putnam cleverly tried to bring metaphisical realism to such an impasse, with his "model-theoretic argument" (a.le.a. Putnam's Paradox). See Van Fraassen 1997a, 1997b, 1997c.

description we could give of nature would fit it equally well. How does it stand with the contention that there is an objective hierarchy among admissible readings so that we can accurately or inaccurately claim a "better fit" for some than for others? That point is accommodated by the (permissible/required) trading and bargaining with our initial responses. We are initially strictly responsible to the deliverances of our spontaneous pre-understanding: we have to accord it great respect. But in general we cannot maintain that respect without difficulty, and must start trading: we'll save these reports as accurate, discard some as inaccurate altogether, and "correct" the remainder. We'll be closer to the initial reading if we do little of that, but that may leave many tensions unresolved. For the sake of greater coherence of our rendition of the text overall we will take this commerce farther, sometimes gradually and sometimes in ways that seem veritably revolutionary to us at the time. This is true in literature, in scriptural studies, and in science, *mutatis mutandis*.

8.

What I have presented here is a "reading" of science and natural knowledge, constructed largely in analogy with a theory of literature. I can well imagine the objections this may evoke. The one critical reaction I shall consider here is that my reading of science and natural knowledge slides down the slippery slope to subjective idealism.[14]

On my view, the structure we discern in nature and describe in our common opinions and science is to be likened to the *intentio operis* we discern when reading a text. Now, it is clearly not part of Eco's doctrine to suggest that the work's *intentio* exists in it independently, in the sense that it would have this *intentio* if there were no readers. Nor does he mean that a reading is objectively correct or incorrect precisely if, or in so far as, it corresponds to a reading-independent structure present in the text. If the *intentio operis* is not independent of the *intentio lectoris*, then it must be dependent on it – but how? When Eco responds, he closes his reply with "I am not ashamed to admit that I am so defining the old and still valid 'hermeneutic circle'." (Eco 1992: 64) The doctrine is subtle at this point, and I shall not try to add to what I explained above. But what should we conclude about the structure of the natural world if that is to be thought of in analogous terms?

[14] In the great Quine conference of San Marino I argued against another over-interpretation of philosophical reflections on science under the heading of "naturalized epistemology"; see Van Fraassen, 1995.

Let us begin by asserting unequivocally that what nature is like does not depend on what we think, or how we view it, or even on our existence at all. The supposition that dinosaurs evolved but humans did not is false; but it is not absurd, not self-contradictory. Galaxies, solar systems, planets, mountains would have formed even if we had never come into being. This should be enough to clear us of charges of at least simple-minded forms of idealism! But now we must leaven this rejection of idealism with the insights we have gained about literate experience.

There is a clear disanalogy between nature, conceived without Author, and humanly produced texts. But is there a corresponding relevant disanalogy between experience (in the role of touchstone for science and natural knowledge) and reading? The whole point of our discussion of literate experience is exactly to deny that.

Here is how I imagine a realist counterattack. Answer me, the realist says: haven't you ignored the great disanalogy between literal books and the Book of Nature? The former are written in a human language, grasped by pre-understanding, grasped somehow in the language in which we ourselves construct our interpretation. But literally and strictly speaking, Nature is of course not written in any language. Doesn't it follow that when we approach nature, any such pre-understanding is lacking? Must we not conclude that not only the story read in the text, but the very language in which the text is to be read, must be created by the reader?

Eco's view was that the intention of the text is present there as internal structure, though not independent of (or ontologically prior to) the reader's interpreting activity. This view succeeds in identifying substantive constraints provided the reader does not have unlimited leeway in conjecturing the *intentio operis*. That in turn requires that the text, the textual surface, offers resistance to interpretation – if the reader's accountability to the text's surface structure is not to be trivially dischargeable. Finally, *that* is so if the text is received as text in a certain pre-existing language, of which we, the readers, have at least some minimal pre-understanding. (Minimal, or perhaps confused, to be cleansed or amended self-critically, but definitely not vacuous.)

I take it that the "ifs" here are all indeed so – thus I take Eco's reply to succeed. The identified constraint can still leave a great deal to the reader, so that "right" (acceptable, tenable) interpretation is still by no means unique.

But is there then any parallel at all to be drawn for constraints on the natural scientist's interpretation of nature? The argument to the contrary, which I put in the realist's mouth, says that what is lacking is

exactly the very last if. Natural phenomena are not received as symbols, words or sentences in a language, of which we already have some pre-understanding.

This contention is false. Francis Bacon would perhaps have liked us to come away with the image of the new scientist before nature like a pre-school child before written words on a page. But almost all he said already belied that. Our very first, spontaneous response to any experience involves judgment couched in our *current* (priorly required) native language. While insisting that we must learn to "read" nature, Bacon directs his energy to illuminating the prior theory infection of the language we already have. But to have such an imperfect and possibly defective starting point is inevitable. We could not even possibly begin inquiry were we not already fully immersed in a language, in which all deliverances of experience are couched.

The argument which I put in the realist's mouth involves a simple fallacy. The agreed premise is that nature is not a text written in some language (not literally the story God wrote in His language, for example). The conclusion fallaciously drawn is that natural phenomena are not received (by us!) as symbols, words or sentences in a language, of which we already have some pre-understanding.

Experience becomes *properly* literate through a process of de-interpretation and by suspension of assumptions (connoted by the very words we use) which were contributed by earlier theories (or leaps of imagination) now up for trial. Elimination of the Idols is very different from the transformation of an empty slate, understanding nothing, into a meaningful text. What we experience resists interpretation, because it is already interpreted (at least minimally, and perhaps confusedly). Therefore, interpretation can only be re-interpretation. It may proceed through a stage of de-interpretation (self-critique which brings tacit assumptions and theory-laden concepts to light). But the de-interpretation can only move us back a little, it does not produce a pure syntax, whose meaning would have to be created *ex nihilo*.

Emphatically: this resistance to interpretation, whether of text or nature, is not the foundationalist fiction of a bedrock of meaning and certainty. We are accountable to the appearances as we first judge them; subsequent inquiry may revise also those initial judgments. That possibility, though always there, does not exonerate us if we do not respect the appearances as described in our initial response prior to critique. "I am not ashamed", to echo Eco, "to admit" that we are here once more in the presence of a hermeneutic circle.

The view I have now elaborated is definitely not a form of subjective idealism. What nature is like does not depend on what our experience or representation of nature is like. *But we must not confuse this point with a naive realism about how we ourselves exist in this world.* As for us, we discern structure in nature; but the structure we discern there, we discern in the same way as we discern a story when looking at ink marks on a page. We read it initially in the language we already have, and even as we change our language, in part by changing the theories with which that language was already infected at our birth, we remain responsible for doing justice to that initial reading. Our present language, like our views expressed in that language, may or may not be radically defective — on this we will later have much to say. But meanwhile, still avowing that language as our own, "This (white powder) is H2O" rivals "This is NaCl", and "Snow is white" rivals "Snow is puce". Our reading, in this language, will be correct or incorrect, responsive to the facts themselves or fanciful, true or false, admissible interpretation or over-interpretation.

The ethic of inquiry is strict, at every level. It is however not, and cannot be, a rule or recipe. (In what language would the recipe be written? A presuppositionless language?) To respect the resistance of the text is to respect the force of our own initial, spontaneous responses to what happens to us – couched as they are in our historically given prior language. Respect is not slavish. Self-correction takes many forms, including local rejection of experience which initially came as if in the voice of an angel. But each form of responsible self-correction is hard. Responsible correction requires following out all its logical consequences, application across the board and not with selective bias, thus revising expectations – which will in turn be either fulfilled or disappointed. And so a new cycle begins... The reader's role continues, as the literate reader construes the text in the language in which he comes to it, and allows the construal to feed back into revisions of that very language, the basis of his literacy.

Postscript. Science and its Empirical Content

As a philosopher I study science not to change it but to understand it. I do however want to change our understanding of science; for science suffers greatly from its prevalent over-interpretations. Whether right or wrong, the view I have presented here has some very specific implications for the philosophy of science. In this postscript I will assume some background acquaintance with recent debates there, perhaps not to be found much outside its narrower academic circles; which is why this section is not part of the body of my paper.

Two scientific theories may be very different yet empirically equivalent – that is, necessarily equally good at saving the observable phenomena. That does not mean that they are equally good in all respects, or that we might not have reasons to accept one rather than the other. But it entails that the full theory is one thing and its empirical content – what it says about the observable phenomena – something else.

What I have just presented is the heart of all empiricist positions on science. But in today's empiricism, this view must be accompanied by views on language and experience of the sort we have been discussing. Those are directly relevant, since "observation" is just the code for scientifically relevant experience. How do these different views – the empiricist distinction between a theory and its empirical content, and the insistence that experience is, if relevant at all, literate experience – go together? How do they qualify each other?

I wish to walk a fine line here. What can be observed, and what there really is to be observed, is a matter of fact – it is not theory-, mind-, or language-dependent, but is there regardless of whether we even so much as pay attention to it. That is one side. On the other side, the question of *what there is to be observed* is a question which in each of our mouths takes on the meaning of the language in which we live and breathe and have our being.

Let us make the point concrete by addressing the question: what is the empirical content of e.g. Newton's physics? To the question so phrased, there is a clear answer in the same terms, namely: that all observable things there are, are precisely as Newton's theory says they are.[15] But question and answer so phrased abstract from all historical context. Abstractly phrased questions and answers take a *definite* content only in *definite* contexts. So let us see what happens when the question is asked at different times in history. To keep it short, let it be asked by someone engaged in modern science in Western Europe – this still leaves us such diverse participants as the Cartesian first apprised of Newton's *Principia*, the Newtonian a century later in the theory's days of glory, and the Einsteinian of the early part of our century, still flush with revolutionary pride.

Clearly the Cartesian will have to *suspend* some of his beliefs and resources for description. He has in common with Newton all new resources for the description of motion, made available by Descartes'

[15] More precisely: all observable phenomena can be embedded in some model of that theory. Things which that theory says nothing at all about are trivially just the way the theory says they are.

analytic geometry: position, speed, velocity, acceleration, as well as number, shape, and volume. He'll place in suspension his conviction about the conservation of the quantity of motion as Descartes conceived of it. But he does not and will not accept all the further descriptive resources of the Newtonian. So he will ask: "If we describe the observable objects purely in kinematic terms, will there be Newtonian theoretical models that fit those descriptions?"

If for Newton's theory we take only the theoretical "basics" – as presented at the outset in the *Principia*, with no delimitation of possible forces – then the Cartesian must answer himself "Certainly!". (This is the correct answer no matter what the description is like, if logically consistent). But those "basics" are only the *theoretical definition* which sets Newton's stage. By itself, that is not yet a scientific theory. To have a full-fledged theory, one needs to add some *theoretical hypotheses*. One such hypothesis would be, for example, that our solar system is a Newtonian 8-body system in which all forces except gravitational attraction between the parts are negligible. That makes available a certain class of Newtonian models for the solar system. At this point, the question of fit is no longer logically vacuous, and can be answered affirmatively only if one of *those* models fits the kinematic description of the solar system.

The Newtonian, though willing to use any Newtonian terms, is still quite willing to separate observable objects from unobservable ones. In addition, he can distinguish descriptions in terms of just those quantities of which we humans are in effect measuring instruments ("of which we can determine the values by observation"). Notice that he will properly do this in Newtonian terms. For example, he'll say that we are reliable detectors of (Newtonian) forces applied to our own body, in the range of m *psi* to n *psi*. Then he will describe the phenomena in terms of those quantities, and describe the empirical content of Newton's (and his) theory as this: "there are models, belonging to the classes our theory made available for phenomena involving observable objects, which fit those descriptions".[16]

We see therefore that the abstractly phrased question must take on a different content in the mouths of Cartesian and Newtonian. Nor is either of them construing it wrongly or illegitimately; on the contrary, they are construing it as they should. But is there such a thing as the

[16] This is phrased a little deceptively: for a given person x there is no difference between "fit the phenomena" and "fit the phenomena as described in x's terms", though of course for an onlooker (person other than x) there may be. Then again, we can all play the role of onlooker upon ourselves...

empirical content of the theory *tout court*? The general question always takes on definite content only when instantiated to concrete situations. There is no such thing as the empirical content of the theory if by that is meant something which is logically equivalent to *all of* the Newtonian, the 20th century, and the Cartesian answer to the above question. There cannot be, for those answers are not logically equivalent to each other. Nor is there an absolutely privileged 'neutral' language to turn to instead as touchstone of empirical content.

This does not mean that scientific theories have no empirical content. We have simply come around to the crucial link between the *intentio operis* and the *intentio lectoris*. The former is a construct, and will differ depending on the person constructing, his background opinion, the language in which he conducts himself. This person is an inquirer, a true student of nature if he remains steadfastly accountable to his experience. That means: accountable to the deliverances of experience, couched (naturally) as his own judgments in his own language. Disappointment of expectations predicated on those judgments cannot be taken in stride – the resistance is to be respected and taken seriously. Once anomalies accrue, response may take a more radical form: revision of the theory which construes the *intentio operis* or, more fundamentally, of the language in which it is written, the very language in which those empirical judgments (responses to experience) are made.

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