James F. Ross: The Fate of the Analysis: Aristotle's Revenge

I. Introduction: Distinguishing Arguments, Enterprises, Discipline and Deformities.

1. Arguments: Analytic philosophers are already auditing their achievements even before their century is done. For the most part, those audits show discontent even with the best.1

Undoubtedly, some jewels of argument were produced, lasting ones; for instance, arguments: (1) that hypotheses are underdetermined by data no matter how much there is. (Those arguments have many forms, ranging from Quine's, to Goodman?s 'grue' argument, to Kripke's 'quus-plus' cases,2 even to an argument I make for the immateriality of thought)3; and (2) that reference is always underdetermined by meaning (in one form, the conclusion is that what you are talking about, a material individual or event, is never exactly determined by what you say about it-which leads to the outcome that ontology (what there really is) is always underdetermined by science, no matter how extensive a scientific account comes to prevail).4 Now those are worthwhile results, though sometimes used for the wrong conclusions.

These, others5 are 'gold medalist' arguments (especially Wittgenstein's disclosures about the inaccessibility of perches for the extrinsic justification of our cognitive and evaluative practices). Still, some recent arguments that appear especially formidable are so embedded in the distorted problematic6 I am discussing, as to lack long-term stability.7 Whether more neutral, disinterred versions will remain important is not clear yet.

2. The Enterprises. The attempt to provide a world-view that offers a secure foundation for physical science is another matter. That?s the rough road that finally beat the body of distinguished argument to pieces; not because there is something wrong with the discipline, but because the background assumptions, which appeared to cohere with science 300 years ago, eventually conflict violently. Nor was the turmoil reduced by philosophers deciding to say WHAT real science is and what counts as science (as Carnap, Reichenbach, Goodman, Putnam, Sellars, and Quine did.)8 To the extent that they agreed, the trouble remained. Their disagreements compounded the damage. Now there is a bewildering controversy about what scientific laws are, are true of, whether there are genuine necessities, whether electrons and quarks really exist and how 'logic' is properly to be used.9

Nevertheless, analytic articulation brought some dull times. Philosophers publish what seem to be tedious ledgers and homework. (In the fourteenth century, too, I think the Oxford Calculators and various Platonists are equally tedious.) Almost as often, they seem to have no sense of scale or strategy, and of course, no knowledge whatever of the conceptual and scientific background of the points at issue. (Rorty makes that point well 1979: 216, and Wang cites him 986: 112). Although the trivialities (e.g., variants of *s* knows that *p* analysis, and various calculi of reasonable belief, and varieties of interpretations of 'Tarski' notions of truth, squabbles about reference and naming, and endless accounts of counterfactuals), were mostly by journeymen, oppressive technicality developed even where the most talented found philosophy chaffing against the fabric of science, or tried to employ mathematical and/or applied logical devices to get substantive results. Consider Putnam's 'Models and Reality,' where, in effect, he uses a logical bomb [the Lowenhiem-Skolem theorem] on an ant, and is even thought by some to have missed wildly10 as well. Whether there is any role at all for such 'formal' arguments is still in dispute.

It was expected that as philosophy got more 'scientific' disputes would be more easily resolved. The disappointment was that solutions did not result from the introduction of improved logical and mathematical techniques. Instead, a riot broke out in the courtroom, like Alice in Wonderland, and competing logics,11 half a dozen conceptions of 'implication' and 'entailment,' for instance, and divergent accounts of mathematics and of set theory were invented and pushed forward as authorities to decide the matters (Note Quine's saying that 'second order quantification is set theory in sheep's clothing'-sentiment I applaud). We went from the smooth music of Bach to the contorted elegance of Stravinsky and Bartok. But 'calculemus' did not displace 'disputemus.'

The current auditing-some of which involves biases, like Rorty's historical inventions, anachronisms and exaggeration-exposes a trail of failed ventures. In fact, every one of the major enterprises of analytic philosophy, even the ones introduced to replace earlier failures, has either 'gone under' or is in final peril as its defensive arguments cannot keep up with the capsizing waves of objection. That includes foundationalism, evidentialism, picture theory of truth and all its proposed successors, all the accounts of counterfactuals, all the accounts of possibility and necessity,12 the foundations of logic, logical atomism and all theories assigning logic place as 'form for all worlds,' all the accounts of representationalism in knowledge, all the phenomenalist analyses of physical objects (whether Russell's or C.I. Lewis's, or Berkeley's, Leibniz's or Kant's), all the logical constructions of physical objects out of sensa, sense data, or qualia (Sellars, Goodman, Carnap13), and all the attempts to explain thoughts as brain states or functions among brain states. They all come down to false promises

and inflated assets. The auditors can already see functionalism, connectivism, the language of thought and the whole Davidsonian and Dummettian analyses of meaning, going 'belly up,' along with the others.

Some of the biggest and long-lasting analytic enterprises had to involve knowing exaggeration both of persons and projects; for instance, of the plan to explain the intentionality of humans physically, when nothing of lasting merit was at hand, or was ever found, that can even explain desire or fear in a mole. Nothing both revealing and convincing has been delivered about thought and brain states by (a) behaviorism (Skinner-Quine); (b) contingent identity theories (Smart); (c) anomalous monism (Davidson); (d) both unqualified identity (Dennett) and attributional identity theories (Dennett); (e) functionalism (Putnam; Fodor); or (f) 'connectivism' (Stitch, etc.). The most useful outcome is that one cannot determine, with certainty, either language competence or intelligence or the consciousness of a device from its linguistic output. Physicalist attempts to solve the mind-body problem have all the modesty and success of toxic waste disposal schemes.

Overall, the biggest establishment schemes converge toward what John Passmore called 'materialistic idealism.''14 That, I think, is the Hindenberg of philosophical space travel.

But the question is 'Why'' Why did such careful philosophers, undoubtedly ingenious and resourceful, end up in positions that demanded retreat from the scientific and realist outlook that motivated the early twentieth-century analysts' Why did they end up retreating toward the idealism Russell so despised' It is because the whole framework, the basic 'problematic' was misconstructed right from its seventeenth-century origin, an origin that most analytic philosophers never understood and never thought even to inquire about. They overlooked (many of them as a matter of principle: Carnap, Reichenbach, Quine and Goodman, especially) philosophy's genetic inheritance. They treated problems as if their ancient and medieval past formed no part of their content-as if the intellectual development of an issue is irrelevant to what is at stake-and as if they had scientific neutrality and the security of formal tools without predecessors for providing the foundations of knowledge and of ontology. [Nominalism, which bore only a family resemblance to the ideas of Berkeley or medieval 'nominalists' like Ockham and Roscellinus, was the ontology of choice.] They simply did not know that with the central problems of philosophy, their content is from their development.15

3. Deformity: To understand the deformity of the basic problematic, we have to adopt a certain standpoint, a line of sight, on the history of thought. One that looks over Aristotle's shoulder, over the medieval Aristotelians, and beyond, over Aquinas' and Descartes' shoulders (at the birth of a general science of matter) straight on through the accomplishments of contemporary physical science.

In that line of sight, it becomes obvious that from 1630 to 1680 the key assumptions of philosophers were remade, redesigned to fit philosophy to the demands of the 'new' science. That was a science of (1) micro-matter, (2) moving deterministically under (3) an initial divine deposit of motion (4) which is never depleted and (5) from which physical phenomena are caused and can be described in mathematically elegant laws. (Key elements of these assumptions have been replaced or radically redefined in the practice of science.)

To fit that vision (and accomplishment) all the old views about natures, forms, mind and understanding had to be discarded. Descartes did that, systematically and with genius. Everyone after him in the chain, all the way to contemporary analytic views, redesigned or renovated Descartes' overall problematic, like new tenants in a country house, sometimes with amazing insight, but without tearing up the foundations and starting again. Thus, all were captured by certain assumptions. For instance, that knowledge is representational, and that the immediate objects of awareness are ideas, that ideas originate 'in the mind' and are not physical effects (directly), and that there are not 'active dispositions in things'-that eventually made philosophy deformed, unable to sit up straight in the chair of science.

The rejection of dynamic real natures made philosophy unable to think straight in the face of rockets, viruses, nerve gas and toxic waste. The recent retreat to irrealism, the hermeneutical turn, is simply a schizoid denial that extant nuclear waste will outlast the English language.

Thus, along that sight line we can predict six features of philosophy-and of science too (1) reinstatement of a theory of inherent forms: that there are dynamic explanatory structures inherent in matter (but inseparable except in thought, from matter, though variously realizable in matter)'16 [from which physical laws are vantaged abstractions]; that (2) such dynamic structures explain, indeed ARE the way the WHAT of a thing is what it does (the continuous regularity of behavior, say, of protons); (3) that the natures of things (the materialized structures) and the abstractable laws, are NOT simply the local aggregations of matter, the way a pile is resultant from the grains of sand'17 but that there are, as yet undiscovered, principles of emergence-principles of what Aristotle called 'eduction of forms for matter' (but could not otherwise explain), by which stable, causally specialized

structures (e.g., cell structures) develop from more general ones (e.g., molecular ones); (4) that human intelligence is the active ability to discern and to recognize dynamic structures in nature (and their consequences, even hypothetical ones), irrespective of the indeterminacy of hypotheses or the undetermination of reference; and (5) that the objective of science is comprehension (not mere truth)-to be streetwise in the universe-and that scientific comprehension of physical reality has to be expressed and aided, with mathematized abstractions, with formal models, and with technology.

The sixth feature needs separate mention because it rejoins modern physicalism to a main feature of Aristotelianism that 'epistemology naturalized', physicalist explanation, has to account for animal perception throughout the animal kingdom. (See 'epistemology naturalized' below.)

4. Discipline: Distinguishing Content and Mastery: Leave aside passing enthusiasms, like the 'verificationists' (A.J. Ayer), the 'analysis for the sake of clarity' followers of G.E. Moore and J.L. Austin18 and the 'ordinary language,' philosophers who used to be thought paradigms of 'linguistic philosophers,' but who mainly turned out to be a sect who misunderstood Wittgenstein by believing that attending to word meanings will clarify problems away.19 Wittgenstein held the much harsher view that, typically, philosophical confusions are so serious as to amount to a disorder of the understanding, usually intellectually terminal on the subject, though he does sometimes follow therapeutic paths.20 I also bypass half of a dozen other emphases and currents21 to reach the establishment analytic philosophers who have distinctive breed markings, though with important differences too-for there are few purebreds among them. The markings include (a) explicit logical and linguistic fastidiousness and unabashed technicality (e.g., Carnap); (b) distinctive clusters of belief, though more characterized by the mixture than the particulars about which there is profound disagreement (Carnap, Quine, Davidson, Putnam, Goodman, etc.); and (c) traces of and inclinations toward American pragmatism (itself a kind of idealism) in which the truth of a scientific belief consists in its working-out in prediction, production and convergence of conviction-in Quine's helpful version: by fitting into the 'the web of belief,' whose outer edges can be torn by experience, while the deep inner threads are more like meaning-relationships or even principles of logic, wholly immune to a slap in the face by experience, and justified, in the formal cases internally and in the case, say, of Einsteinian generalities (e.g., the speed of light), by how well they organize the web as a whole. (Notice, there is no notion of 'necessity' even about logic in this view, in contrast to Frege on the one hand and the early Wittgenstein on the other. That is why I say the markings vary greatly.) There are further marks: (d) resolute reductive physicalism (that everything is made of and explained by physical phenomena), which even Russell seems to have held, though W. Sellars's 'neutral monism' and Davidson's 'anomalous monism' seem surer examples; (e) a conviction that the formal structure of natural languages is that of first order quantificational logic,22 so key arguments and definitions are written out in an imitation of mathematical form, (although some of the best analysts never do that);23 (f) commitment to making philosophy clear and argumentative, like physical science; (g) commitment to an infinity of causally inert abstract objects, usually numbers and in some cases, sets and even groups and categories to 'make arithmetic come out true,' and logic too; and (h) gradual habituation to at least limited arguments that the form of our talking and of our thinking becomes or even makes the categories of things.24 In a way, that is not a radical reversal of the early positivist impulse that the basis of science is truths-by-convention, or 'protocol statements' or 'stipulations,' but a more sensitive replacement. Nevertheless, the doctrines are all in tension, variously resolved and modified by individual writers, but by their oppositions effectively defining the field of play in which the controversy is to be wagered. People who will not play in that framework are deemed not to be players.

Eventually, what was originally designed to replace the nineteenth century idealisms (left-over Kantianisms) that the positivists and analysts had found insufficient to explain the 'necessities' disclosed by science, became a retreat to a linguistic/conceptual 'idealism' (in Putnam's case, virtually explicit Kantianism, cf. The Many Faces of Realism) to explain the limits and limitations of science.

The most general doctrines of analytic philosophers such as materialism, physicalism and representationalism are not directly argued. Rather, they are supported by far more particular and definite positions. For example, arguments that thought and sensation are matter behaving computationally; that learning a natural language involves an induction to the grammar; and25 that meaning for a language is the truth conditions for the sentences (Davidson). Many of the particular positions have already been formidably attacked and weakened.26 That is especially so with the doctrines (i) that sentences are truth-bearers; (ii) that there are sense data that are the building blocks of perception; (iii) that linguistic meaning is truth-conditions; (iv) that the formal structure of natural languages is that of first order quantification); and (v) that sentence meanings are made compositionally

from word-meaning components.

In the disarray of controversy, some philosophers dismiss abstract objects (propositions, properties, logical relations, etc.) as being 'causally inert' and not worth postulating, though there is an equally broad Platonism, even among materialists, who happily postulate infinities of abstracta. All are in trouble over the 'objective' status of logic. There are too many competitors, and the idea that propositional logic (or any other logic) is the form of all worlds, is just untenable. The 'status' of logic and of mathematics and of 'laws of nature' has become a stumbling block to the very enterprise that was supposed to settle the matter.

It should not be surprising that supporting doctrines survive despite having been discredited, or at least badly battered. Verificationism, as the mark of scientific content, survived for decades after Carl Hempel (1934) showed it to be self-referentially inconsistent. So does 'all truths are revisable,' Putnam's slogan (and practice). Apparently, the survival of a position depends not on its expected truth, but on (i) the attractiveness of the alternatives and (ii) the establishment status of those who reject it. So while new ideas like functionalism, 'wide content/narrow content,' 'connectivism,' etc., last about as long as television series (and adapt, change plots and actors, too), the basic stratagems last as long as the professors in the major schools lack attractive replacements.27 So, the characteristic content of analytic philosophy, which is quite varied and in great internal conflict, survives by inertia, and by its proved value as a teaching material (like a classic casebook in Law, only needing updating regularly). The embarrassing estrangement of philosophy from science is only peripherally apparent.

5. Philosophical Mastery: Analytic philosophy, as a conflicting cluster of doctrines, contrasts with analytic philosophy as a tradition of clarity of argument, that I think was nicely illustrated by Bertrand Russell's Introduction to Mathematical Philosophy (1919). The circumstances of its origin have allied such craftsmanship with certain general issues: meaning, truth, necessity, counterfactuals, law-likeness, applications of logic and mathematics to material reality, the status of logic and of laws, whether thought as 'functions among brainstates,' whether a natural language is learnable by induction, and so forth. Part of the explanation for the topics is the interest in making philosophy 'scientific,' which was quite evident early in the century. And part of the interest is that these 'analytic modes' will keep arising and demanding an account, just as they did in ancient philosophy and in medieval philosophy, no matter what new account we propose for the foundations of knowledge, ontology, and science.28

Analytic philosophy as a discipline is another matter. At its best, it is the pursuit of concert-quality articulation in the expression of philosophical comprehension as connected courses of reasoning. It is not the only kind of mastery at expressing a connected comprehension of things. Some phenomenologists are masters of disclosure. Sartre and Wittgenstein, in separate ways, create and display insight with unique literary forms by creating successive DISCLOSURE experiences (marked as 'ah-ah') in the reader. Since the object of philosophy, like science, is expressed comprehension, display and disclosure of comprehension can be just as effective as concert-articulation of cogent reasoning. In fact, as Plato exemplified, the greatest philosophers master both forms of expression.

Nevertheless, the historical unity of the discipline (which seemed to Russell like a new invention, as it did to Descartes in his version) should remain in focus, both to keep what is truly valuable, rightly prized, and to avoid confusion with superficials.29 Concert-articulation of cognent comprehension is a mark of great philosophy, with an enormous variety of literary forms from Plato onward almost without exception, and something allied with the clarity and attractiveness of the very greatest (such as Plato, Aristotle, Plotinus, Aquinas, Descartes, and Spinoza), along with their novelty, depth, and imaginativeness. Many recent philosophers are also master craftsmen at elegant connected reasoning (analytic), or at successive disclosures (dialectic) and often both, regardless of their confined historical perspectives.

6. An Event of Diagnostic Interest: The physicalist-nominalist thinkers, from Carnap to Quine, Goodman, Putnam, Davidson and others were forced by their own arguments away from scientific realism (which Quine, however ardently reaffirmed in 198830) toward Goodman's 'irrealism' (the view that there are as many realities as there are true versions), and Putnam's 'internal realism,' which is, in effect, that, our views of reality are limited to our successful science (and philosophy) with no other access available.31 Besides, we are reminded that we have structures of discourse and thought (sometimes called conceptual schemes) some of which (say, the categorical judgments) are the very 'machine language' of thought.32 That blocks any access to a reality 'wholly beyond' thought.

Perhaps, we should call this 'agnostic noumenalism,' to make clear that 'internal realism' is a retreat to

which Putnam gave an honorific name. For, 'internal realism' is a position that is exacted by the various commitments apparently made in this century,33 but actually made three centuries earlier the representationalism that shows up in his 'Brains in a Vat,' the 'immediate awareness of ideas' that runs throughout all his work, and the need for experience-forming thought or language structures, kind of 'machine language of the mind,' (see above) to explain the organization of experience within which we are prisoners. Something is fundamentally wrong with the way the problematic is formulated.

Thus, the front line of materialism, the scientific physicalism, has bulged backward, pushed by the force of the underdetermination arguments that require us to admit that there is a large element of convention, discourse practice and outright making up in scientific theory, both of the hypotheses and of the data,34 and that in the end, because the making up is not haphazard, there has to be a mind or language-structure that (like Kant's categories, or conceptual schemes that we invent) explains (perhaps even causes) both our hypotheses and our data, and, in general, our experience. This is a retreat toward idealism, just where the twentieth century 'naturalized epistemologists' intended not to end up. Moreover, in a final act of faith, like the end of Samson and Delilah, many materialists still affirm that thought is constituted by the behavior of matter, and thus (since matter apart from our thought is not even accessible to experience), why reality presents itself to us as the observable cosmos (experienced in our uniquely self-centered subjectivity), cannot be explained at all!

This might seem the shipwreck of so proud a voyage, where philosophy and science intended to sail to the heart of matter and the ends of being and ideal space.35 Now there is worse an offer. Namely, intellectual drug culture—the bleak abandonment of bipolar oppositions between the true and the false, the necessary and the contingent, the caused and the uncaused; the ironic abandonment of the notion of explanation; the clamorous deconstruction of every distinction central to the old enterprise, even to calling science just an other form of politics.

Mastery at argument has no chance where success, as Descombes says,36 depends on clamor, access to the press, and rise to the list of required texts at Les Ecoles Normales. Thus, even among some learned, wise, but tired analysts like Rorty, an age of scientism has passed into an age of self-adornment.

II. The Etiology of Disaster: The Infant's New Clothes37

The disintegration of analytic doctrines I have outlined above does not explain how philosophers so skilled came to be cornered in their options, and had to back into positions they or their teachers began this century as 'positivists' thinking odious. The explanation lies in how it began in the seventeenth century and in what happened to science afterward. In brief, Descartes, from 1630 to 1643, retailored the philosophical resources for dealing with the new mechanics of nature in such a way that philosophers, constrained by his assumptions or their substitutions for them, became progressively less able to explain what the sciences actually accomplished.

Step I: Mechanism. Early in the century, Descartes and a few others envisioned a new science of nature (roughly, terrestrial and celestial mechanics—for res extensa under divinely imparted, universal and conserved motion). Descartes developed his astrophysical theory of vortices, and various principles of physics and of the conservation of motion, with particular emphasis that matter (res extensa) is governed entirely by universal mathematical laws. He held that all matter, contrary to the presentations of common sense experience, is completely deterministically mechanical, like clockwork, and throughout exactly 'the same,' differing only in relative position, velocity, aggregation, and so forth. (It is as if the whole cosmos were a contained body of water, all in swirls, underwater-waves, currents, vortices, and ripples explained as one system in motion with universal laws which tell how an initial deposit of divinely imparted motion is transformed forever in the relative motions of the particles.)

Now that glimpse of what later became Galilean, Kepierian, and Newtonian science, plus insights into many other physical phenomena, opened the vista for a new story about the world. That new story, the clockwork universe, needed (1) a proper foundation for the certitude of science (namely, that we can be sure of the new science despite its conflicts with commonsense experience), and (2) yet needed to be shown consonant with, and even to support, the accepted religious views about 'God and the Soul'38 (that Descartes, Galileo, Keppler and Newton sincerely believed in). That required a complete recutting and resewing of the philosophical cloth—a deep reconception of the nature of physical things and of the mind.

The recutting and resewing did not happen by mere invention. Rather, Descartes adapted Augustine where he needed him to replace elements of Aristotle and Aquinas he had to reject or could find no use for; that is especially prominent in his theory of sensation and 'the inner man,'39 though it can be found in many aspects of his treatment of the mind and ideas.

Not only the Aristotelian theory of change (involving form, matter, and privation) in which physical local motion is a resultant had to 'go' because it was incompatible with the matter-in-motion determinism of the new physics. The underlying theory of forms had to be rejected along with everything that depended on inherent forms; namely, all real natures and active dispositions. that was when they threw aside the old stones for which there was no use. So the new philosophy became 'nominalistic' about natural kinds like horses, cows, iron, etc.; see below, though not about the one material substance, res extensa.40 Classifications that belong to a world of common sense and are opposed to the disclosures of the new science have to be regarded as things to be corrected (though not necessarily to be replaced, just as we do not replace our talk about sunrises and sunsets).41

In the Cartesian science, you do not need dispositions in nature because nothing basic does anything different from anything else. Newtonian mechanics had a more refined version of the same idea, where all physical motion is governed by the same simple laws with everything basically doing 'the same' as everything else (again under Divine causation). Therefore, as Descartes triumphantly concluded, 'there are no little minds in matter.'42

Aristotle's substantial forms seemed to Descartes and to others who embraced the new science to be a fantasy, mere magic, and unnecessary, dynamic powers in matter, which are scientifically nonsensical, and clearly replaceable by general mathematical laws for a single stuff. Even Leibniz, who says in his Discourse on Metaphysics, section 10, that there is some significance for metaphysics in Aristotle's forms, reiterates that there is nothing there for physical science.43

Step II: Making Sensation and Feeling Mental. The second revolutionary change was a vast reconception of ourselves and of animals, required to make the world fit the picture of matter in deterministic motion. In particular, Descartes took a giant step backward to Augustine's dualism of an immaterial rational soul, vigilant throughout a material body and responsive (according to its own program) to it, and denied that there is animal consciousness or feeling. They are just machines, 'a matter of springs and screws,' he said.44

Aristotle's rule, and Augustine's too, that a material cause cannot have an immaterial effect,45 was applied rigorously by Descartes, and the 'immaterial' or 'mental' was reclassified by Descartes, as it was by Augustine,46 to include all sensation, feeling, desire, will, thought, emotion, awareness, memory, imagination, and consciousness.47 They are all contents of the soul. So for Descartes, in humans alone among material things, does the mental occur.48

Descartes adapted Augustine's view that the soul's awareness, 'vigilance,' extends everywhere in the body because the soul loves the body and produces all the feelings, sensations, and desires, as well as the thoughts and willing, from a treasury of ideas provided, as needed, by divine illumination. For 'illumination,' Descartes substituted the view that all ideas are innate and thus, all 'proper sensibles' (to use an Aristotelian phrase) are from the soul without any resemblance to the bodily states that occasion them, correlated by divine decree with brain-states of which they are 'the meanings' (significations), and all ideas are present to inner awareness, the mind's eye, the inner, interior person (which is the res cogitans). All mentality comes from the substantial soul which can, however, produce small physical effects which do not (to use an anachronistic Leibnizian reconciliation) alter the vector sum of motion, which is conserved,49 but result in our gross bodily motions.

The effect of those changes in the philosophical problematic, and the subsequent trial, rejection and further replacement of occasionalist (Malebranche), materialist (Gassendi), and phenomenalist (Berkeley, Leibniz and Kant) partial substitutions for Descartes and then Kant's hypotheses have rippled outward over the three centuries until we reached contemporary 'constructivisms'—among which 'materialistic idealism' is the most startling—that can no longer explain scientific knowledge, except as a form of literary invention, with 'the world well lost.'

Meanwhile, scientists have gone on with their test tubes, magnetometers, cyclotrons, etc., to produce electricity, gasoline, plastics, ceramics, graphite solids, space flight, laser surgery, dioxin, holes in the ozone, toxic waste, organ transplants, agent orange, artificial elements,and designer drugs, as well as to find out that there can be 45 billion atoms on the head of a pin with the nucleus of each less than 100,000th the length of the atom's radius (to its outer electrons) and with each nucleus composed of protons and neutrons (with protons having mass 1800 times that of an electron), so that the head of a pin roughly resembles vast portions of the galactic universe.

Readmitting the Animals. Now we notice curious omissions in science and curious limitations. No scientist has even the slightest explanation of how a clam can feel hungry or how a snake can desire a rabbit (and never desire a tree), or how a horse can be satisfied by a bag of oats or a camel by a rest in the sun. Neurological and chemical promises fill the air, mostly made by philosophers. The chain of things we can explain gets longer day by day, from the first photons impinging on the retina, to pigmentation reactions in the optic nerves, to chemical even molecular shape matching as optic-cerebral electro-chemical circuits are completed. Yet, no matter how long

you make the handle of the broom, that won't make it sweep. Neurology, chemistry, microbiology, all promise, or at least by the philosopher are said to promise, but cannot explain how even a fly gets hungry or smells at all. Now, I say this not to sneak back to Descartes' idea that insects and animals are robots without feeling, but rather to emphasize Aristotle's and Aquinas' conviction that they do have feeling and cognition that it is the business of science to explain.

Returning to the forms requires returning to notions of cognition that were trashed with the forms. The whole post-Cartesian mind-body problematic resulted from adapting Augustine to fit mechanistic science, while Aristotle (and Aquinas) stood for 'epistemology naturalized' for all animal cognition. The proper ambit of 'epistemology naturalized' is the whole of the animal kingdom. That creates a demand on science. 'never mind man and thought, for now; deliver your promises with the worms.'

As Aristotle said, whatever has appetite has imagination. All over the animal kingdom, even in the insects and the spiders, there is the search for mates and desire aplenty, and often loud bellowing, growling, whining, groaning, and some of the weirdest mating dances of the wood grouse that you could ever see. The sixty to a hundred million years of dinosaurs, some as little as chickens and others five stories high and ninety tons with two brains,50 (like an articulated fire truck with two drivers), was not the age of the robots. Imagination, cognition, and complex feeling roamed the earth nearly a hundred times longer, maybe even a thousand times longer than humans were here at all. External sense is only part of the task. It is internal sense and appetite, as Aristotle knew, that holds the solution to animal cognition, cognition without an 'inner self.'

Though it is still beyond the power of scientists to explain, it is over the edge of madness for a philosopher to deny that there are complex molecules (very complex, organized into cells and organs) that have desires, imaginations, hunger, fear and often anger and satisfaction, and in higher mammals love and contentment (even without understanding). These enormous material systems are worms, flies, June bugs, cockroaches, alligators, dogs, apes, whales and, in part, humans. There can be no other explanation than that there are dynamic structures in matter,51 the equivalent of Aristotle's forms, and when the molecular and atomic structure is also taken into account of 'real natures.' Cf. 'nature' in Aquinas, De Ente et Essentia.

We simply cannot shrink back into Cartesian robotism about the animal world. There are entirely material things that perceive, hear, see, taste, touch, smell, desire, rage, seek mates, thrill, tire, and die, and all the time imagine and remember, and move (not just are moved). There are complex molecules that are aware, that are watching, maybe even sometimes watching you, whether it is a mosquito with a taste for blood or a lion with a taste for meat, or a predator after the thrill of killing you.

Neither physicalists nor Cartesian dualists are happy with animals. Both held their breath and looked away for a long time (the way I go by the snake cage at the zoo), until now, it is obvious how profound the anomalies actually are: (a) Descartes (in the Meditations) became convinced, and furthermore was sure he had a divine guarantee for it, of a wrong answer to what he was, as did Augustine.52 Secondly, Descartes thought (b) matter does not have emergent features, or any features explained only by laws for material entities whose medium, but not whole reality, is matter, like the meanings of written words or mathematical equations or geometric drawings. (He apparently overlooked the mystery of the words he wrote in ink while preparing his meditations.) He thought there were no cases where the features of the message cannot be explained by the features of the signal (the matter)—modern cryptography dashes that hope. And (c) he did not, and could not know that there are dynamic propensities everywhere in the cosmos that are not explicable by a universal physics of motion, and could not even be there if everything were exactly the same as everything else at some ultimate physical level.

Although we now have the opposite anomaly of too many distinct particles, and a somewhat sloppy theory as a result, we know that there are different real natures [say, protons and electrons], different mathematizable, causally interactive propensities.53 In brief, science has revealed what was there all along, namely, dynamic structures inherent in matter, basic force-fields that do what they do because of what they are. Moreover, there are materialized structures [natures] (e.g., genetic code) which have physical effects that are like meanings (because explained by the structure rather than the stuff) which in turn have physical effects.

Everywhere in matter there is 'software,' like little bundles of directions (both continuous ones and conditional ones) packaged in matter, doing things that matter cannot otherwise do.54 Before we invented software, we had no easy analogue for real forms in things;55 nor could we easily understand that by whistling a tune or saying something, we can organize matter, we can produce forms by producing materialized structures with distinctive physical behavioral proclivities (e.g., a sound that has physical effects dependent on the structure we made). The structures we make supervene on, and are wholly immanent in physical systems, yet are not mere resultants of the principles of the systems.

Aristotle's vindication against those who took refuge in physical science to scoff at substantial forms as magic is that maturing science finds dynamic structure everywhere, perhaps even to differentiate the basic force fields. Afterall, what is a force-field but 'constant causation that is a contrast-dependent mathematizable structure with spatio-temporal parameters'' (In effect, 'a spatio-temporally configured WHAT that has a distinctive, universal, constant pattern of physical effects'.)

There are physical phenomena that cannot be explained without there really being dynamic structures; that is, continuously causal, mathematizable synchronic56 structures in things that account for what they do. All such structures have a universal dematerializable element, like the meaning of a word (even a formula, as Aristotle said), that is the object of understanding and is 'replicable' in many kinds of matter; (e.g., melody can be in score, sound, tape, etc.). As Aristotle said, 'form as such can be received in many kinds of matter.' THAT science affirms and needs.

Step III: Rejecting the 'Dematerializing' Understanding. Such dynamic structures are just what the infant science of three hundred years ago neither needed nor could comprehend, and so denied with a resulting lack of need for a 'dematerializing' understanding.

Philosophy, under the influence of 'the way of ideas,' moved on to other notions of the understanding and of general knowledge, mostly image and association theories and ennumerative inductive generality. We now have to return to the notion that there are real natures of things, that everywhere matter is like 'a programmed tool with the power on.' Even though the natures accessible to our present science may be only resultant and not the basic cosmic particles or force-fields, still there are innumerable things (or forces) that do what they do because of what they are. Those are real natures (essence: explaining and exhibited in a thing's operations). We have to explain how we can know them.

As I said, to explain the success of science as the discovery of the natures of things (namely, the discovery of what about them explains what they do), we need the very notion, inherent form (as continuous mathematizable cause of behavior), that the infant seventeenth century science had to reject. But that requires that we reinstate the accompanying notion of the 'dematerializing' understanding by which we grasp 'the formula' that explains the behavior! Thus, Aristotle's is a complete revenge.

The Coming Revolution. The result is to be a new revolution in philosophy in which we throw away the baby clothes Descartes made out of traditional philosophy to fit the infant science and to explain its certainty, and, along with it all the other outfits made for the same mannequin by the rationalists, empiricists, idealists, positivists, and 'physicalist-idealists.' We also have to throw away all the subsequent amendments that put us out of phase with science like simple determinism, simple notions of 'matter' as having primary qualities, or that 'motion' and 'extension' are physically fundamental, the immediate awareness principle, the inner spectator principle, the 'veil' of perception, and many more besides. Further, we have to reintroduce notions of the mind that (a) allow a physicalist explanation of animal cognition and (b) a dematerializing human intellect to grasp real forms and make patterns with them and transformations of them.

We will have to return to a notion of dematerializing understanding to explain how we can know the real natures of things despite the limitations of the underdetermination of hypotheses and the indeterminacy of reference, because science does successfully discover and make technologically real natures. Unless we can explain how we know what the real consequent natures of things are, (e.g., that the 'rotational laterality' of a building is and how to measure it),57 the success of science will remain a miracle.

The Origins of Forms. But can there be principles for the distribution of specks of sand or droplets of ink or paint to produce a Bach chorale' In a sense, yes, provided we suppose the chorale already to be in existence and the physical process to be a copying from one materialization to another (or an accident). But otherwise, no not without the idea from the composer.

Now, that is the problem involving real natures. Suppose there really are thirty-seven fundamental particles (quarks, leptons and bosons) and maybe some force fields (with discontinuous realizations).58 What explains (a) the existence of such fundamental nature' (b) their variously 'combined' outputs (effects) and additionally, what is 'causation' or real explanation anyway since it is such an important mark of 'the real'' (see Hacking, p. 146). Moreover, we must not try to explain those notions in terms of some mind-independent, object-independent logic either. For, as I mentioned, the project of showing logic to be the objective 'form' for all worlds simply disintegrated. Real things do not have logical relations, only thoughts, (and their materializations) do.

Without stopping to argue more of the case for forms, I note instead, that we have in our time produced

some amazing examples, most prominently, THE COMPUTER (I capitalized the word to emphasize the resemblance to a Platonic Form which Aristotle held to be immanent in matter). 'Being a computer' (while entirely immanent to each material computer), cannot be denied to be a dematerializable, intelligible form, variously materializable, having no existence except in particular cases and in symbolizations and representations, and yet to be the intelligible object that is EXPLANATORY of the unique behavior of millions of artifacts.

Besides, we made artificial elements, superconductors, transistors, transponders, microchips, and of course the software itself, which is nothing but materialized states that are entirely formal in their content. Every time we design a program or speak a sentence we make a form. Form, as product of intelligence disposing matter within its obediential potency according to intelligible paths to active physical effects, is no problem. Form, not the product of intelligence, yet the dynamic and diverse patterns of the cosmos, integrated into non-destructive unity, now that presents a problem both of origin and of continuation.

The notion of a general understanding that requires animal awareness as a medium, but is understanding obtained by abstraction of form from matter in experience requires that, as the ancients thought, we have the ability to dematerialize things. That stands in stark opposition to notions of general understanding as 'universally general propositions inductively confirmed and decomposable into singulars'59 that flourished after the new 'way of ideas' and endured right up to the present time. In fact, the impoverished notion of general ideas is intrinsic to the irrealist consequences that have been drawn from the underdetermination and indeterminacy of reference arguments. The cure is to reinstate the notions of abstraction and comprehension.

There may always be some indeterminacy, even a great deal, about the natures of things, mainly because we cannot predict exactly the conditioned dispositions of things under extremes (pressures, temperatures etc.), that fall beyond experience and mathematization from it.60 As Aristotle said, the proper object of the embodied understanding is the natures of material things, and the object of science is the discovery of the natures of material things. Yet, he went on to say that we in fact had scientific knowledge of the natures of very few things. Now, we know more consequent natures by far, but the truly basic ones seem just as far away.

It may be easier for us to grasp the consequent natures of things, for example the rotational laterality of a building, than it is for us to grasp what explains neutrons or protons, because too much invention, mathematization and obtuse abstraction is involved in what falls so far from the sensible, and because of the difficulty of performing suitable experiments by which to assure us of the 'reality' of what might only be 'mathematical parts,' (the quarks, etc.), the way four dimes, two nickels and two quarters 'make' a dollar.

It has been argued that there are now unbridgeable gaps in empirical science because the resolution of some disputes requires particle accelerators as large as the Milky Way, or would require immense time scales for space probes or space labs. Science may have to change to fill in what we previously intended to fill in with experiment by far more elaborate mathematics that may always have alternatives, and thus leave the constitutive natures of the 'ultimate' material units indeterminate. (There may, of course, also be no 'ultimates,' but rather, 'the structured,' relatively, 'all the way down.') That would not challenge the certainty of our knowledge of the resultant natures of things. For example, the way chemical reactions occur, the way we know that one ounce of 2,3,7,8 tetrachlorodibenzo-p-dioxin (known as TCDD) in the water supply of a large city would kill about one million people, without actually conducting the experiment. What is challenged, instead, is any theory of knowledge that suggests we do not know that.

So, too, sometimes abstraction alone allows for certainty, not because alternatives could not be consistently described, but because relevant alternatives in its context are non-existent. For example, a necessity of nature is necessary not because the 'opposite' is inconsistent, but because the actuality exhausts the relevant potentiality of things, so that there is no contrary with referential content.61

There is a kind of natural necessity to a work of art, too. The removal of the creative hand ends all relevant counter possibilities. All alternatives are empty. So it is with necessities of nature. Sometimes, as I said, successful abstraction exhausts the alternatives. But that just reminds us that we have to distinguish sensation, e.g., of a color or sound or taste from a perception, memory, imagination, desire, and all of those from understanding and judging (in which alone there is truth) and willing. The software by which a living material thing is alive and by which it has its distinctive powers as, say, a mammal instead of a bird, and its particular powers, say as a leopard instead of a monkey, has to be entirely realized in the matter (just as 'wordperfect' is entirely realized in copies of it), and entirely destroyed with it.

Laws can have no reality in nature apart from matter, and then only because matter is organized (has mathematizable dispositions). Laws are abstractions from the behavior of matter, not vice versa.

Moreover, the succession of forms in the cosmos presents a problem. Aristotle had only a name for it,

'eduction from the potentialities of matter,' and offered no explanation. We need one and will have to invent one. We cannot be content with the notions of 'emergence' we have,62 but need a general account of the succession of forms and consequent natures.

Allowing Aristotle the accomplishment of being so far ahead that it took three centuries of science even to grasp what he had explained and to reproduce it is not the same as letting a dead man rule the roost. Now we have to make the story 'play,' adapting it to what we now know. We cannot explain yet how we get any genuine form-considered as a dynamic constant mathematizable cause of lawlike behavior, determinate for every conceivable cosmic environment, existentially embedded in what is-from matter, except by transformation (and combination) as when we combine ammonia and detergent, or heat iron to 2700 degrees farenheit. We need to explain emergence. We can understand how we make forms, even persistent ones like nylon, and materialize them: in art, music, literature, mere letters, lists, software, nylon, plastique, and medicines. But the most obvious forms of living things do not come about that way. Maybe there are second and third 'layers,' logically, of the simplest natural particles, that explain all apparently 'emergent' structures (life forms), as if ink spots might be so complex as to explain all texts made of them. That does not seem likely, however.

Conclusion

Though we have to step back more than two millennia to realign the philosophical perspective from which to look at the success and the limitations of science, and although we have to reframe the philosophical problems and rescue assumptions that were simply discarded because of a misunderstanding of the potentiality of science in the seventeenth-century, doing that will not make our problems go away. It just gives us a standpoint for reframing our conceptions of knowledge, certainty, necessity, truth, and error; and good motives for starting the inquiry all over, without disrespect for the genius that worked within the deformed problematic.

Because the content of philosophical problems is genetically determined by the dialectic of their development (regardless of how much brilliant writers, ignorant of the history, think they are free, while repeating classic moves and understanding the problems with a collective intellectual consciousness), all versions of 'the philosophical problematic' may be deformed somewhat. So we have to restrict ourselves to conceiving a competing problematic for the relationships of philosophy to science, with due knowledge of all the great work of the ancients as well, as our contemporaries. One that sees that the key alterations made in the seventeenth century, though exactly the ones demanded by the times, were the wrong ones, the mistaken ones, the ones that wait-listed the resources gathered from time to time throughout the previous two millennia.

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Notes

1. Richard Rorty, Philosophy and the Mirror of Nature, Princeton: Princeton University Press, 1979). See also the essays by R. Rorty in London Review of Books, 1987, and his 'Pragmatism, Relativism and Irrationalism,' Proceedings of the American Philosophical Association, vol. 53, N. 6., 1980,

2. S. Kripke, Wittgenstein on Rules and Private Language, (Cambridge: Harvard University Press, 1982). N. Goodman, Ways of Worldmaking, (Indianapolis: Hackett, 1978), and his earlier Fact, Fiction and Forecast.

3. The argument is from 'Immaterial Thought,' Chapter 7 of Truth and Impossibility, forthcoming: (1) Every physical process, no matter how long (even infinite), is indeterminate among incompatible pure functions; (2) so, no such process can be IDENTICAL with any of them, nor can it uniquely determine a function among processes that is IDENTICAL with any pure function. (That follows from the arguments used by Wittgenstein, Goodman, Kripke and many others.) (3) But we know beyond any doubt that WE think in forms that are pure functions (addition, squaring, conjunction, modus ponens) and are not indeterminate among incompatible functions. THEREFORE, our thinking, in so far as it is the realization of a determinate pure function, cannot be any material process or any function among material processes. Thus, human thought as intelligent is immaterial. I think that argument will survive along with the argument that the understanding can have no organ and similar considerations recited in that Chapter. But one must remember that the argument is not to be understood to deny that the medium of human awareness is animal consciousness [see Aristotle and Aquinas, both saying human understanding requires sensation], which is properly regarded as a physical (or physically based, anyway) process, explicable scientifically.

4. Thus dislodging Carnap's empty hope that you do metaphysics by doing more general science. See Hao

Wang's comments on Carnap's and Reichenbach's projects, and Quine's versions of them, also the remarks of Rorty and of the more sympathetic Stemuller. Of course it has turned out that the contrast of science as 'observational,' experimental and conformational, while philosophy is 'mere tautology,' 'conceptual clarification,' or 'logical construction' was a contrivance of errors. Science is even more constructive than perception, and philosophy can be at least as 'empirical' as the best science. See Arthur Fine, 'Unnatural Attitudes: Realist and Instrumentalist Attachments to Science,' Mind XCV (1986), 149'179. Also, The Shaky Game: Einstein, Realism, and Quantum Theory, (Chicago: University of Chicago Press, 1986). The paradox is that once the philosophers started to criticize those hyperboles about science, they went to such extremes, saying all observation is so contaminated with theory, that theory is not really about real things, and that confirmation is an incomplete, and circular status that does not distinguish the true from the false, and even that there is something fictional about the contrast between the true and the false, and that its basis needs reformulation: Ways of Worldmaking. Rorty purveys a popularized, pragmatized version of it.

5. For instance, arguments that consistency cannot assure real possibility; that physical objects cannot be phenomenalist-constructs; that 'no proposition is unrevisable' are incoherent; that correspondence the ones of truth are incoherent. There are similarly outstanding arguments by every major writer, including Wiggins, Strawson, Austin, Ramsey, McDowell, D. Lewis, S. Kripke, Chisholm, Searle, Fodor, and a wide array of others.

6. Apart from formal results, like the G'del incompleteness results, that have few or no direct applications to philosophy. Even they are often misunderstood or misapplied. H. Putnam misapplies the Lowenheim-Skolem theorem in 'Models and Reality,' obfuscating the different semantic roles of 'what we mean' in ordinary science and theory, and the absence of such controls in formal systems. See Plantinga's 'How to be an Anti-Realist' Proceedings of the American Philosophical Association for a trenchant criticism.

7. For example, Davidson's 'The Very Idea of a Conceptual Scheme' in Truth and Interpretation is based on notions of 'translation' and 'reference' that do not cohere with what we know about the untranslatability of natural languages (thousands of Spanish expressions have no English translation), and about the 'interdeterminacy' of any translation of Hegelian thought into the discourse, say of Plato, or Quine, or Hinduism, and will not bear sustained examination. He seems to reiterate the same basic stance in the otherwise fascinating 'The Structure and Content of Truth,' The 1989 Dewey Lectures, Journal of Philosophy (1990). To have any major part of a philosophy based on the idea that it is incoherent to say there are mutually inaccessible conceptual schemes, seems to me risky indeed. See my Chapter 9, 'Double Truth' in Truth and Impossibility.

8. See J. Passmore, Recent Philosophy, p. 10, for instance.

9. Nancy Cartwright, How the Laws of Physics Lie, thinks there really are electrons, say, but that 'laws' are not about the real values in nature. See Ronald Laymon, 'Cartwright and the Lying Laws of Physics,' Journal of Philosophy, (July, 1989). Ian Hacking (Representing and Interviewing), is more of an experimental realist, but generous about the made-up elements of science. Bas van Frassen (The Scientific Image) is an unrepentant instrumentalist, and so, anti-realist. Now we have new kinds of irrealism, Goodman's and Putman's 'internal realism,' and only the unskilled David Bohn, a physicist, is on the ramparts of realism, but defending a 'necessitarian' realism (Wholeness and the Implicate Order) with various other extremists like Paul Churchland (Scientific Realism and the Plasticity of Mind) and Paul Feyerabend (Realism, Rationalism and Scientific Method). Barwise and Perry Situations and Attitudes) are refreshingly critical of the mis-applications of 'logic' and of other antics of analysts.

10. H. Putnam ['Models and Reality' (Journal of Symbolic Logic, 1980)] thought that it is in principle possible to reassign the references of the whole body of scientific truths, while preserving their truth, just as if we were moving a plastic triangle from one area of a page of points to another, and drawing its outline and deducing geometric theorems about the enclosed dots, we could not conclude from the truth of the theory to the independent existence of the things of which it is true. That is, the triangles, and the bisectors, etc., are not 'there' independently of the template and theory in virtue of which they are true of the points.

11. See J. Passmore, Recent Philosophy, p.611 for a description and citations.

12. Even Kripke's rehabilitation of 'a posteriori necessities' was against the distorted background of Humean and Kantian assumptions about our non-experience of necessities (and the divisions Kant imposed) and, so, historically localized. The issue left is, whether within the constraints of the background, there is any way to explain how we know with certainty that water is made of hydrogenhydroxide. However, the basic argument Kripke uses that identities, properly stated, are necessary if true is one of the ornaments of analytic philosophy (and a standard view in medieval logic-see W. and M. Kneale, History of Logic).

However, applied quantified modal logic grew up, like a fungus (see Ross, 'The Crash,' cited above) into a

poisonous, mostly Platonic metaphysics, with a science-fiction variant that D. Lewis invented, to 'fill in' Kripke's earlier formal framework for the consistency of modal systems, with an ontology for necessity, causation, counterfactuals, and the like.

13. R. Carnap, De Logische Aufbour der Welt, see Mary Hesse, pp. 14'17 in John Passmore's Recent Philosophy. Passmore provides a good explanation of the 'constructivist' enterprise.

14. Passmore, op. C.T., p. 667, 'Identity Materialism' (Davidson); 'Central State Materialism,' p. 15.

15. Thus every creative philosopher works with a degree of risk, because even with the best education, he cannot know in all the relevant, perhaps even crucial detail that forms the content and limits the options the general considerations-say, 'physical determinism vs indeterminism, and how that is related to the notion that physical causes cannot have immaterial effects' (which still guided Berkeley and Kant long after the medieval and ancient sources were rejected).

16. Just as a tune can be imagined, hummed, broadcast, recorded, played, performed, scored, and yet exist nowhere apart from materializations. Some call these 'abstract particles' because they are not forms but like them.

17. Though in a trivial sense, one might say the universal features of matter (say, what accounts for its consisting of force-fields) can be described as what explains its exhibiting every nature that it exhibits anywhere, e.g., protons, neutrons, quarks, bosons, mesons, w-zed particles, atomic elements, molecular structures and, so on up to the galaxies and supernovae. But that will be just our SAYING SO, not something we can explain. Whereas, if we start with the elements, natural and man-made, as given, we can 'explain' the natures of things (the organization of matter that is a constant cause of regularity of behavior) in resultants 'all the way up.' Consequent forms are accessible. 'The basic ones,' if any, we do not know.

18. In whose spirit, some brilliant arguments were developed, like those of Richard Cartwright, Philosophical Essays, (Cambridge: MIT Press, 1987). Especially 'propositions.'

19. J. Wisdom and N. Malcolm, both of who, of course, did other distinguished work.

20. See Remarks on the Foundations of Mathematics and On Certainty.

21. (1) Strawson's conceptual metaphysics; (2) A.J. Ayer's positivism; (3) N. Malcolm's linguistic analysis; (4) R. Chisholm's 'Augustinian-Truth conditional' technique; (5) O.K. Bousma's informal analyses.

22. See Kripke's note on Davidson in W and S. Earlier analysts were convinced there can be a formal philosophical discourse, an ideal language, (e.g., Carnap).

23. Some, like Paul Henle, had an irresistible urge, when philosophers start to refer to sequenced propositions by numbers, to say 'Bingo,' as he did once during a long paper.

24. A microcosm of these features, including circularity as I mention next, is Dennett's recent account of intentionality. A system, say, brainstates, is intentional just to the extent that the best explanation of its behavior from the standpoint of an explaining system, is that it be described as having mental states.

Now if intentionality is 'viewpointed' and 'attributional' alone, that is 'by extrinsic denomination alone,' then both an infinite regress and a self counter-case are the result. For one thing, nothing Dennett thinks about himself would count as thought, if he were the only human left, but only what the ants and spiders attribute as the best explanation of his behavior; and, if nothing, he does not think. If other things make no explanations, then even the first man did not think. So how he or his offspring ever got to explain things at all is left trailing.

Besides, if nothing is intentional unless something else thinks it is then nothing thinks unless something else describes it as doing so. So the notion of thinking is used in the explanation of attributed intentionality, namely thinking, with evident circularity.

25. See Weinstein, Osherson et.al.

26. I realize that is tendentious, especially given Davidson's tailored reaffirmation of his key positions in Lectures, 'The Structure and Content of Truth,' Journal of Philosophy, (1990), pp. 279'328. But I think the weight of published argument supports my claims.

27. One of the reasons John Rawls's A Theory of Justice (1970) was so successful is that there had been no attractive successor to utilitarianism for almost a century. Another, of course, is that it was generally attractive, properly thought out, both for its 'fit' into the larger Kantian perspective and to the capitalist, meritocratic, equality-minded Americans of the 1970s. Thinking people, then, not only wanted equal liberty for all. They wanted a justification in benefit to the less fortunate, for the important advantages of the far better off.

Rawls's theory of original justice cannot operate as a theory of remedial justice in our society where less then 1% of the people have a total amount annual income equal to all the income of the bottom 40% of the whole population. That is, less than 2.4 million people have an annual income equal to the whole income of 100 million Americans in 1990.

Besides, even with its already dated features, Rawls's theory is a better theory of original (not remedial) justice then any of its immediate contenders (which is the way Rawls himself argues for it).

28. On the tradition of these topics see William and Mary Kneale, The History of Logic, and I.M. Boshenski, Medieval Logic. D.P. Henry, That Most Subtle Question, (Manchester, University of Manchester, 1984).

29. Not to mention that many contemporary thinkers are just as much journeymen as the medieval 'cimini sectores' ('the hair splitters' who were laughed at in later times, e.g., Rabelais's Gargantua et Pantagruel). See D.P. Henry, That Most Subtle Question, for a tour de force on issues of existential commitment and naming from the middle ages to the most recent debates. That puts things into perspective.

30. W.V.O. Quine, Journal of Philosophy (1988). I have to skip the fringe sects and enthusiasms of analytic philosophy, such as 'ordinary language philosophy,' 'verifiability is meaningfulness,' and 'scientific explanation is hypothetical nomological deducibility,' and Chisholm's 'foundationalism.' They went belly-up years ago in the first ominous swells that something is wrong. In fact most of the little boats, evidentialism, foundationalism, etc., broke up then.

31. See Hilary Putnam, The Many Phases of Realism, (Lasalle, IN: Open Court, 1988), essays 1 and 2. In one way, the proposal is trivial. We said we could 'inspect the world' without the science and conceptualizations we employed to discover it. In another, it is a version of Goodman. Reality is as varied as truth. The difference here is that Goodman says we somehow 'make' reality; Putnam leaves that undecided. So, I call him an 'agnostic noumenalist.'

32. It is to be noted that Donald Davidson vigorously opposes the descent into irrealism involved in the notion of conceptual schemes and argues that the notion of competing conceptual schemes is itself incoherent; paper mentioned above.

33. For sheer deviltry, compare Aquinas' explanation of how the faith of the devils is exacted, without the merit of faith. Ross, 'Believing for Profit,' Ethics of Belief Debate, e.d. G. Mccarthy, (Atlanta: Scholars Press, 1986).

34. N. Goodman, Languages of Art, (Indianapolis: Bobbs Merrill, 1968). 'The scientist denies his data the way a politician denies his constituents'.

35. In fact, Descartes in his Meditations proposed, like Augustine in his Soliloquies, to find knowledge of God in the Soul.

36. Vincent Descombes, Modern French Philosophy (Cambridge: Cambridge University Press, 1980), p. 28; 172-173.

37. Rodger Penrose, The Emperor?s New Mind (New York: Oxford University Press, 1989).

38. See the place assigned God and the soul as the object of philosophy, by Augustine, Soliloquies, and by Descartes as the objective of inquiry, ?Preface? to the Meditations.

39. See L. Holsher, The Reality of the Mind (London: Routledge & Keegan-Paul, 1986). G. O'Day, Augustine's Philosophy of Mind (Berkley: University of California Press, 1987).

40. The Cartesian cosmology, as far as I understand it, did not actually resolve the problem for which Lucretius introduced the 'swerve,' because it didn't explain why any divergent subpatterns in matter were required; for everything to make way for everything else in motion.

41. I do not know of a fully dedicated Cartesian replacement realist in the twentieth century until Willfred Sellers and Paul and Patricia Churchland. Maybe there are others.

42. See Descartes' Letter.

This, of course, stands in marked contrast to present-day cosmic physics where the universal principles seem to require some thirty-seven different basic particles (quarks, leptons and bosons), though 'simplification' is still the objective of theory, but without the determinism or mechanism.

43. I thank M.D. Wilson for this citation. The differential and integral calculus attempted to turn the statics of the new science into a dynamic mechanics without having to invoke any explanatory principles that would be like Aristotelian natures.

44. See Descartes on animals.

45. I already remarked in Putnam's case that this rule still has powerful implicit force in philosophy. Even the dedicated materialist hesitates to display an immaterial effect for which there is supposed to be a material cause. Instead, we either get 'sensa' that are both (Sellars) or subtle 'anomalous monism' (Davidson) that says there are no laws connecting the mental and the physical, or unexplained qualia, N. Goodman (The Structure of Appearance) or Quine's behaviorist promises.

46. See Gerard O'Daly and Ludger Holsher, both cited above. Both have ample quotations that support what I say.

47. Henry Chadwick, Augustine (Oxford: Oxford University Press, 1989) says Augustine is credited as the first person to discover the unconscious mind.

48. Moreover Descartes embraced Augustine's important notion of the subjectivity of experience and of the 'inner man,' (see his Soliloquies where Augustine says, 'one finds God in the inward man').

49. I use a later notion introduced by Leibniz to reconcile the effect of the mental on animal spirits within the Cartesian doctrine of the conversation of motion. M.D. Wilson told me about the 'reconciliation.'

50. One in the head and one in the tail, for simultaneous a priori and a posteriori thinking.

51. See Stephen Makin, 'Aquinas Natural Tendencies and Natural Kinds,' The New Scholasticism, (1989).

52. Descartes thought we are a 'substantially unity' of two substances, res extensa and res cogitans. Augustine, that we are a spiritual substance using a body. Both were wrong on what seemed most certain.

Shakespeare, Measure for Measure, II, iii, 11, lines 117'123, says man is 'most ignorant of what he is most assured, his glassy essence'. [I thank Jenny Uleman for the reference.] That was written before Descartes, Spinoza, Locke, Leibniz and Berkeley made their mistakes.

53. See I. Asimov, Frontiers of Science (New York: E.P. Dutton, 1989), pp. 75'77. See again 'nature' in Aquinas, On the Principles of Nature and in De Ente et Essentia.

54. We can even package propositional logic on chips, as 'and,' 'or,' 'if-then' and 'not' switches, and can make chips whose 'form' is a logical tautology.

55. Peter Geach pointed out that a form is like a wave in water (for which the mathematics is complex but understood) not made out of it, but passing through it and explaining the behavior of the water.

56. I mean 'present all at once' even though the materialization is spread-out in space-time, and the content of 'all at once' is 'not limited in causal role by the speed of light.' That, of course, tells us this causation is not efficient, or productive causation; for that is limited by the speed of light. But is 'formal' causation, causation of what a thing does from what it is, that is not an event relation at all. There are various 'what-it-is causes what-it-does' relations but only the ones that invite a cognitive advance or 'more general features' causally count.

57. To head off misunderstanding, I point out that not every resultant event requires a real nature amounting to some analog of software. For instance, to mix ammonia and detergent in the right proportions will cause a bad gas or an explosion, but the outcome is a resultant (a consequence) of the natures of the items in the mixture. The features that explain, say, explosiveness of gasoline may be entirely consequent on a material form that is more general in explosive liquids.

58. The number is not important, the multiplicity is.

59. Where universal generalization requires decomposition into singular propositions with proper names, and inductive confirmation requires an enumeration of all cases or a statistically adequate substitute for it. That is not what we mean by reporting 'Iron is magnetizable,' 'Hydrogen has one proton,' 'mass determines space, space determines mass.'

60. Who could predict that hydrogen, a colorless gas, would become a black solid at pressures approximating the center of the earth', or that hydrogen would boil at four degrees above absolute zero'

61. I explain this at length in my Truth and Impossibility, forthcoming.

62. See the one I suggested in 'Christians Get the Best of Evolution,' in E. McMullin, ed., Creation and Evolution, (Indiana: University of Notre Dame Press, 1986).