Philosophia Mathematica

AN INTERNATIONAL JOURNAL
FOR
THE PHILOSOPHY
OF
MODERN MATHEMATICS

Second Series, Vol. 4 (1989) No.1

THE NEW WORLD SYNTHESIS

N. Vivian Pope

In a conference at Munich, in 1985,[1] Professor Morris Berman described what he calls the "New Age" in scientific philosophy. The old mechanistic philosophy, he says, was that of a nature which was essentially dead. This, he judges, is now entering its decline.

This "New Age", however, as Berman sees it, is filled with confusing talk about "systems theory", "holograms", "morphenogenic fields", etc. We are urged, he says, to take a *cybernetic* view of reality, to view life and nature as "self-organized information-flow". Much of this, he believes "is important and perhaps even true". But is it, he asks, really a break with the mechanical philosophy? In his opinion,

> The new cybernetic world-view is, like its Cartesian predecessor, still based on a mechanical metaphor. In Descartes' case it was a clock; for the New Age it is a computer. In the last analysis, we are still talking about nature as a machine. That the computer is more sophisticated than the clock is neither here nor there.

Although concurring with most of Berman's analysis of the New Age scientific developments and the moral/intellectual hiatus it has created, one may take issue with his negative conclusion that "nothing has changed". The difference with this new cybernetic model of reality is not that it is just another, more sophisticated machine but that it replaces determinate mechanical processes with non-mechanical *information processes*. The computer is the new model for science because it happens to be the first product of technology to show us how ill-conceived were our notions of physical causality based on a too-primitive knowledge of too-simple machines. The hiatus Berman describes is an inevitable accompaniment of the so-far uncompleted transition from the old world-synthesis to the new.[i]

---

[1] "Metapolitik", by M. Berman *Resurgence* 115, March/April, 1986, pp. 17-19.

To understand what has happened in science, we have to understand how scientific knowledge is obtained. Science is not about "facts". It is about theories as to how to interpret observational information. Even our plainest so-called "facts" are observational interpretations, of a more or less habitual and conventionalized kind. This is what lies at the root of the modern scientific developments, which have emphasized the observer-based and generally perspectival character of modern physics, as opposed to the ubiquitous "God's-Eye-View" presumption of classical science.

This perspectival character of modern physics is called "relativism" and the stress on "information" goes along very naturally with it. Such information has to be *processed*, and that is where the connection with computers or information processors lies. The following will demonstrate how even the most cursory acquaintance with computers can provide an entirely new understanding of how the new observational or "relativistic" science works.

Imagine a drama enacted on the screen of a computer – a fairly sophisticated one which allows the viewer to select, at various stages, alternative courses of action offered by the computer program. These choices he transmits to the scenario through a key-controlled screen object which remains central to the picture, and as the keys are operated the scenery as a whole moves with respect to this "observational centre". The central screen-object is, as it were, the "body" of the operator in the video-world, and it is in the interactions of this body with other screen-bodies that the operator plays his part in the unfolding of the drama. (Most of us nowadays have seen computer-games of this kind.)

With a little stretch of imagination, let the screen-world so described be the operator's one and only world, and let the control-room and keyboard be his brain. Like ourselves, we will suppose, this operator has no experience of anything other than what comes to him via this equipment.

A babe born to this video-world soon finds that his experience has *dimensions*. Screen-objects have length, breadth and depth. They are separated according to visual qualities such as direction, size, brightness, duration, etc., and other qualities such as accessibility and mobility, relative to his screen body. Certain regular events, analogous to the rising and setting of the sun, the phases of the moon, the ticks of a clock, etc., serve for him as arbitrary time-standards. This gives him a time-dimension whereby he measures the movements of screen objects in the other three screen-dimensions. By this means he gains some impression of the characteristic kinds of behavior of these objects, such as their readiness or reluctance to respond to his efforts to move them or to influence them in other ways.

In seeking such control Babe has already found, early on, that not all these bodies are purely mechanical in their responses. Some have wills of their own. These are under the influence of other controllers, let us suppose, (the equipment is, say, a central processing unit with many user-terminals, the users being known to each other only through the behavior of their " screen bodies). This situation is almost precisely as described by Plato in his "Allegory of the Cave".[ii] There, the only communication between the chained-up prisoners was by means of shadows cast by the firelight on the cave walls – plus, of course, the language in which the prisoners (who were otherwise unknown to one another) discussed their interpretations of these shadows.

In the same way, from the manner in which the video "shadows" in our analogy behave, the sounds they make, etc., our no less troglodytic Babe learns what, in the broad "behavioral" sense of philosophers like Wittgenstein, is called *language*. By means of this language, Babe, as he grows, learns the conventional ways of interpreting what goes on. If he does well, then he probably goes on to university (all on the screen, of course). There he learns the principles of mechanics relating to these screen bodies, imbibing the theories of earlier observers – his Copernicuses and Keplers, his Galileos, Newtons, etc. This provides him with an authentic language-stereotype, replete with its definitions of "velocity", "force", "mass", "momentum", etc., etc., in terms of which, thenceforward, his interpretations of screen-events are directed.

If the picture is very fine-grained, then large bodies will have seemed to him to move in a smooth and continuous way. And if this is the way Babe has learned to think of large bodies as moving, then it seems natural for him to think of small bodies as moving in the same way, according to the same mechanical laws. However, Babe discovers that this is not the way very small bodies do behave. The smaller the bodies, the jerkier or more indeterminate their movements become, a limit being reached where the ultimate "elementary particles" do not move in any mechanical way at all but jump all over the place, appearing and disappearing here and there with no screen-continuity whatsoever. How else would it be, when they are no more than discrete dot-events on the video-screen matrix? (For the non-technical reader, a picture on a video-screen consists of separate electronic point-flashes in a time-sequence on a zigzag line, beginning at one corner of the screen and ending in the corner diagonally opposite. The picture seems to cover the screen due to the persistency of human vision. With that persistency reduced we would not see a picture at all but only a zigzag succession of formless point-flashes.)

However, no one in Video-World knows this, so Babe writes up his findings and is given his Doctorate. He has discovered what he and his colleagues decide to call the "quantum", the fundamental indivisible unit of which all actions in Video-World consist. But everyone is perplexed. How can particles of matter possibly jump about from place to place, in the way they do, without crossing the intervening space?

Now we outsiders, of course, know the answer. It is because at this lowest analytical level the Video-World physicists are no longer dealing with the drama as such but with the ultimate informational dot-events into which the action analyses. It seems to them, however, that some strange theoretical disruption has occurred in passing from the "physics-of-the-large" to the "physics-of-the-small".[iii] If they could see this situation as we see it, the reason would be self-evident. However, they do not see it that way, and because they can only think in their classical mechanistic terms they are confused; and in its persistent attempts to explain this situation in such mechanistic terms, Video-World science soon parts company with Video-World common sense. Theory follows esoteric theory to explain why it is that these "particles" (the dots) behave the way they do. "Field continua" and other "hidden mechanisms" of the strangest kinds are theoretically invoked. It is assumed that the dots are "things" just like other things on the screen but possessed of special powers enabling them to ignore the normal limitations of screen-distance and time.

Nor is that the worst of it. Babe's textbooks had always referred to something called "the speed of light in video-space" – "light" being the supposed physical agency carrying, between the screen objects, the information signalling one another's

existence. This "speed", the textbooks said, had been measured, by various methods which had shown it to be a constant, *c*, for all observers, regardless of their motions relative to one another and to the light-source. But why does light behave in that strange way? Why is it the speed-limit of all physical interaction? And why do the durations of bodies become stretched or dilated as their speeds approach that limit? (These, by the way, are the notoriously strange-seeming consequences of Einsteinian relativity.)

Knowing that all the dimensions on the screen are basically time-dimensions makes these questions easy to answer. The reason, for instance, why *c* behaves so strangely is that it is not a *speed* in the same sense as applied to the motions of screen bodies. It is simply the ratio of arbitrary screen-distance (in metres) to time-units (in seconds) in the intervals between the ultimate quantum dot-events. It is a limit, which cannot be exceeded because it is the basic operating-rate of the computer. If the Video-Worldians had been more fortunate in their original choice of units they might have chosen units such that instead of being *c*, the ratio of distance-units to time-units in all screen-dimensions would have been one, and all talk of *c* as a "speed" would have been redundant. All video-space interactions would then have been pure *time-sequences*, all measured uniformly in time-units (e.g., seconds).

The reason why motion stretches the durations of bodies relatively to one another is then plain. Being geometrical combinations of time-measures in the different screen-dimensions, mechanical motion stretches the durations of bodies in the same way that a ship travelling east across a north-flowing current travels further as a result of the two motions together than due to either one on its own.[iv] [v] What complicates things for the Video-Worldians however is, again, their ingrained mechanistic way of interpreting things. They have to think of these effects as somehow connected with the "speed of light in video-space" with all its supporting rationale of "fields", "waves", "photons", etc., linking-up the dots in some continuous, mechanically determinate way.

All considered, then, Video-World thinking is a mess, with its "quantum theory" and its "relativity" the twin pillars of a ridiculously elevated esotery. With our outside knowledge we can see what is wrong. Video-World physics is based on a false precept, which is that the ultimate explanations of mechanical phenomena are themselves mechanical, creating the absurdity of an infinite reductive regress. There is a much simpler, more logical way of interpreting things. It is that the constituents of mechanical phenomena are not more and more mechanical elements, *ad infinitum*, but bits of *pure information*. This makes information-theory, not mechanics, the most basic science – hence, the relevance of the computer, as opposed to the clock or the steam engine, as a model for understanding physics. The mechanistic educational traditions, of the Video-Worldians, however, prevent them from realizing this, so they are forever trying to peer inside and beyond the dots for "hidden mechanisms" rather than into the scenario itself for the "ultimate explanations" of what goes on on the video-screen.

Now the *computer* referred to in this analogy, with all its internal wiring, etc., is no more than incidental to the principle it is intended to illustrate, which is that it is *information* ("language" in the sense used by modern philosophers, or *logos* in the sense of the ancient Greeks), not our traditional "mechanics", which lies at the root of things. This principle is as applicable to our own circumstances as to those in the analogy. Like Babe, we construct what we know of the world from bits of

observational/instrumental information (our action quanta). These neither move nor persist in any absolute sense. It is their observational arrangements and sequences which give us the phenomena of material persistence and motion. From the ease or reluctance of objects to move or change their motion in response to our sensations of effort we extrapolate all those measures of force, mass, momentum, energy, etc., of which physicality consists. We read and interpret this information (to change the analogy) like the letters and words of a story – which makes physics, in the last analysis, a communicational transaction between a "reader" and a "text". What this text is "in itself" when there is no one reading it, or who is its Writer (or Programmer) are metaphysical questions which are beyond the concerns of Physics as such. Excursions into such metaphysical realms by professional physicists, however, have been made and are, undoubtedly, the cause of so many of those confusing "New Age cults", of which Professor Berman complains.

Be that as it may, there is no "machine" standing behind the phenomena, be it a "clock" or a "computer" or any other kind of mechanism whose workings are waiting for physicists or technologists to reveal. Any such mechanism, as Berman rightly observes, is a mechanism still and creates for us the same sorts of problems as for the folk in the analogy. Information is not "waves", "particles", "electromagnetic field-disturbances" or whatever, "travelling in space". It is simply *information*, which, at the level we are dealing with, is atomic, ultimate and irreducible – in a word, *quantised*.

So the computer model does not imply, as Berman supposes, just another "mechanism" of a more modern and sophisticated kind. In our analogy it is simply a device for showing the primacy of information in matters of physics. It weans us away from the traditional misconception that we are automatons in an automatic universe, that all our thoughts and feelings, our moral and spiritual evaluations and aspirations, etc., are inconsequential –that they are, as someone has said, just "ghosts in the machine". It emphasizes our *involvement* as self-directed, forward-looking beings. It stresses our *responsibility*, both socially and as individuals, for gathering and interpreting information, for making creative and correct assessments, wise judgments and vital decisions. What it does, short, is to "write humanity back into the physical equations".

"Nature" as known to modern science, therefore, is as much what we make it as whatever it might be in itself. We are forever at the "keyboard" of our senses, continually extracting, interpreting and acting upon *information*. In this lies the essential difference between the philosophy Berman calls "mechanistic" and the new observer-involved, "relativistic" philosophy. No difference, in fact, could be greater.

NOTES

[i] See "The Overdue Revolution", N. V. Pope, MENSA, April, 1987, pp. 28-29.

[ii] *The Republic of Plato*, F. M. Cornford, Oxford Univ. Press, 1961, Ch. XXV.

[iii] See, e.g., "The Hinterland Between Large and Small", C.J.S. Clarke, *The Encyclopedia of Ignorance*, Ed. By Duncan & Weston-Smith, Pergamon, (2nd ed.), 1978.

[iv] See "Relativity is Kids' Stuff" School Science Review, Vol. 70 (**253**) pp. 86-87.

[v] See "A New Approach to Special Relativity", N.V. Pope and A. D. Osborne, *International Journal of Mathematical Education in Science and Technology*, Vol. 18, No. 2, 1987.

* * *