

COMMITTEE IV
The Relationship Between Science
and The Arts and Its Relevance to
Cultural Transformation

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THE FACTIONALIZATION OF SCIENCE FICTION

by

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Science fiction dramatises scientific possibilities, and with the former as with the latter, linear development is convention only, not an ultimate truth. Plutarch had no telescope when he deduced that the mountains of the Moon were higher than those of earth, and we find in that early science fiction work, **Kepler's Dream**¹, in 1634, an "account" of a visit to the Moon, with details of that body and its inhabitants.

This comment on **post hoc** reasoning is set out here initially so that it can be kept in mind, though in general a linear development will be followed. This allows us to assume the view of leading British author, Brian Aldiss, that science fiction began with Mary Shelley's **Frankenstein**, and developed via Verne in France, Wells in Great Britain, Tsiolkovsky in Russia, and under the influence of the great editors, Hugo Gernsback and John W. Campbell, in the United States. In what follows, it should be remembered that few modern science fiction authors consider their work as being predictive in the main, but rather extrapolative. The original title of the 1940 Robert Heinlein novel, **If This Goes On...** well expresses that point of view.

Verne prided himself on his scientific accuracy: certainly he hit the bell with his choice of Cape Canaveral for a moonshot, but no current publisher would carry any novel as loaded with tedious detail as were his. The fact that those books were widely and avidly read is an indication of the differences of outlook and background between readers of that time and those of today. An increasingly large percentage of today's science fiction readers are unwilling or unable to submit to the set-piece lectures so beloved of Verne. A word on this matter of readership is perhaps called for here.

With the "new wave" of science fiction writing in the 1960s, there came a demand for better characterisation and improved style. Indeed, writers such as the American, Ursula Le Guin, have provided that. There were always a few "old

hands," such as Heinlein and Jack Williamson, who always did pay attention to characterisation, freshness and credibility of plot. Add a handful of very recent authors and we can say that to some extent this demand has been met.

Unfortunately, the genre suffers at the moment from the same disease that has affected large-scale publishing generally: what appears to be a deliberate decision to write down to a public best described as semi-literate. And if these readers cannot confront good writing, still less can they confront real science. This is not to say that hard-line science fiction does not continue to appear, but that books of this kind are not likely to make the best-seller lists. As for hard science in the short story area, it seems now to be restricted almost entirely to the magazine **Analog Science Fiction/Science Fact**, a large percentage of whose readers are professionals--engineers, teachers, and the like. I will not analyse this situation further, but I think it important that newcomers to this genre realise that while scientifically valid and exciting science fiction stories are still being written; you have to look for them, and not be put off by the fact that the first half-dozen books you may pull off the shelves optimistically labelled "science fiction" may turn out to be pallid imitations of Tolkien or C.S. Lewis.

The names of Verne and Wells are frequently invoked together, but the difference between them was very considerable: the former considered the latter "a mere romancer." Indeed, this description was accurate, given the use of science in the Romantic movement, of which we may consider Wells a late follower. By this, I refer to Wells' unique gift for putting across to the newly-emerging young humanist-liberals the use of science as a potential for material and psychological liberation--what has been rather unkindly referred to as "Wellsianity". Unkindly, but perhaps not unfairly; an arguable case has been put forward to the effect that Wells' personal history was such that a deeply religious nature was deflected into pushing

forward the idea of a perfectible humanity, salvation by faith being replaced by salvation by works - scientific works. And, to be sure, responding to this call, an entire generation rose up and worshipped.

I can still recall vividly the cover of an American science fiction magazine bought by me as a boy; it portrayed a strange humanoid figure, all head and eyes, with minute arms and legs. It was a long time before I was to realise that this, and similar widespread portrayals of "home futuris" stemmed from Wells' early article, "The Man of the Year Million", written in 1893, at a time when its author was still strongly influenced by the evolutionary ideas of T.H. Huxley, under whom he had studied. The illustration I had seen came out in the late 1930s, by which time the stereotype had taken hold quite strongly. More importantly, the onward-and-upward theme had become gospel for millions. That provides a rough estimate of around 30 years between the inception and the widespread acceptance of what, when you come to think of it, represents a rather odd notion.

This is important in rule-of-thumb guidance when discussing "cultural earthquakes"; in general, one can estimate 20 years as the average time needed for a new concept to penetrate 20th-century society. But this lag is subject to variable factors: technology can speed it up, and particular cultural resistances slow it down, or act as a filter, accepting some ideas while resisting others, even from the same source. Indeed, the latter phenomenon is well visible in the working-out of Wells' ideas. Let us take his novel, **The World Set Free**, published in 1914. There are predictions that are quite appalling in their accuracy. The atomic bomb, for one. Or consider this quote: "..he was told that the men had struck that day against the use of an atomic riveter that would have doubled the individual efficiency and halved the number of steel workers." The Visible Smoke Law, "by which any production of visible smoke with or without excuse was punishable by a

fine," has long been with us. The Public Health and Morality Inspectors are a moot point: we have the former, and there are those who describe them as being very willing to exercise the function of the latter.

However, there is still no Shakespeare Memorial Theatre in London. And we may be grateful for the non-fulfilment of some of Wells' views, as when in a non-fiction work, **New Worlds For Old**, published in 1908, he wrote, "a State that undertakes to sustain all the children born into it will do its best to secure good births. That implies a distinct bar to the marriage and reproduction of the halt and the blind, the bearers of transmissible diseases, and the like." It is just as well that the man lacked the tactical political ability to get his ideas translated into reality. Unfortunately, his work did have some bearing on the eventual materialisation of the atomic bomb and the tank, and his views on sexual and related freedoms predisposed the public to great changes, delayed though they were, in common behaviour and in the law itself. Wells was a "cultural earthquake".

If the British public was well-disposed to a bright technological future, the American public was positively dying to learn about it. **Amazing Stories**, published in 1926, and edited by the legendary Hugo Gernsback and by T. O'Connor Sloane, was an immediate commercial success, and despite many changes of owners and editors, is still being produced. The *Encyclopaedia of Science Fiction*: edited by Peter Nicholls, published in 1981, gives an interesting listing of subjects covered by the indefatigable Gernsback. It runs thus: Automation; Crime and Punishment; Definitions of Science Fiction; Discovery and Invention; Fantastic Voyages; Heroes; Machines; Mars; Media Landscape; Moon; Near Future; Nuclear Power; Origin of Man; Physics; Rockets; Science Fiction Overtaken by Events; Scientists; Space Flight; Space Opera; Utopia; Weapons. All this, let me remind you, in a truly popular magazine. Some earthquake!

Like Verne, though perhaps with less justice, Gernsback prided himself on his standards of scientific accuracy, so much so that Brian Aldiss has said, of this supposed accuracy, that it introduced a "deadening literalism" into the field. Whatever one's views, there can be no doubt that **Amazing Stories** helped convince an entire generation of young people that something called science, whatever it was, was on the verge of introducing a brave new world. To say that some of the ideas mooted were cockeyed to the point of insanity, and that the prose style of most of the magazine's contributors was atrocious, is beside the point, because we are not here considering science as a subject, but as a source of inspiration, a volcanic eruption whose outflow was to continue, in other magazines, and in the hands of other editors, to predispose the views on an entire continent--nay, of the whole western world.

Let me give one instance: Strategic Defense Initiative (SDI) is associated with President Reagan. But how many of you will connect it with the name of E. E. Smith, who wrote the "Lensman" series in **Astounding Stories** around 1938-1940? All these are now in print in paperback, and, I understand, selling well the world over. I can recall reading them with enjoyment in the original magazine form, this being my first introduction to what is now called "space opera", a genre where the plots of the western novel are translated into terms of space-ships in vast quantities outmanoeuvring each other across the galaxies and attacking with force-beams planets equipped with defensive shields. The **modus operandi** of SDI is all there in those stories.

I return to the history of **Astounding Stories**. This was founded in 1930, and like **Amazing Stories**, is still very much in print, now under the title, **Analog: Science Fiction/Science Fact**. For most of its first decade, it continued in the well-worn tradition of disguising cowboy stories by giving the cowboy a spacesuit

and a blaster, and sending him out somewhere beyond the moon. There were honourable exceptions, but not many. The rates paid to authors were not high, and the magazine's stable of writers contributed detective, cowboy and romantic stories to the relevant magazines with glorious impartiality.

However, another "earthquake" was on its way in the form of John W. Campbell, who took over as editor in 1937. Campbell was educated at Massachusetts Institute of Technology and at Duke University, where he graduated in physics in 1932. A man of vast energy and imagination--his own science fiction stories are classics in the genre--he determined that, as far as his magazine was concerned, the word "science" should be at least as important as the word "fiction". Accordingly, he set about creating a new stable of writers who could plot, create characterisations of credibility, and, above all, write in such a way that the scientific notions they introduced were integral to the plot. If the imaginations of these authors faltered at times, this was no problem; Campbell himself was at hand to supply suitable ideas. There was, for example, a young, unknown, hopeful author by the name of Isaac Asimov, with an idea about a series dealing with robots. Had he considered, asked Campbell, the type of controls that might have to be built into them? Here was born the famous "Three Laws of Robotics". (1. A robot may not injure a human being, or through inaction, allow a human being to come to harm. 2. A robot must obey the orders given it by human beings, except where such orders would conflict with the first law. 3. A robot must protect its own existence as long as such does not conflict with the first or second law.) Though Campbell was at pains always to give full credit to his authors, the fact is that many of "their" ideas were his.

The current distrust of science means that Campbell is regarded by many as some kind of ogre. Therefore, I think it important to direct attention to what made

him unique as a cultural influence. It was his devotion not to science, but to abstract thought. "I don't care what they think," he is on record as saying, "as long as they, by God, think." The results could be distressing. I recall the screams that filled the air when he wrote an editorial on, "Rape As An Evolutionary Mechanism". At all events, his concentration on science came from his view that this was the sole remaining area where the nature of the subject obliged workers in it to be objective. In an earlier age, he might have edited, or written, stories based on logic, as did Conan Doyle with Sherlock Holmes. As it was--think of the effects of the cultural earthquake expressed by such a man, proselytising to a devoted readership for close on four decades.

Let me illustrate. I quote from a letter to one of his authors, "What's needed to break up monopolies is a strong and effective patent law rigged very specifically in favour of the independent inventor...So Met Eng has the rhenium source in the galaxy? So what! Given those Chaytor energy-yielders, and a high-power molecular science, some hot-shot in some lab is going to remember $E=mc^2$ and work out a process for synthesising the atoms he wants. At this point, even mighty Met Eng is in trouble, because they've got n bilbucks tied up in capital investment in something no longer needed. Being Big Business, they lack flexibility to switch suddenly to a totally new approach."

Again, "Somebody works out a cheap way of growing pure tungsten 'whiskers', i.e. perfect flawless crystals of W of minute size, in quantity. Now a perfect tungsten whisker is known to have a yield strength that makes even your hypothetical leybyridite look like sissy stuff--they run 2,500,000 psi! and its known that two-phase materials, properly compounded, can approach the theoretical ultimate strength of the stronger of the two phases. Vide epoxy-glass plastic--and if you haven't actually handled that incredible material, you should try it. Looks like

cardboard, has the general heft of a calendered cardboard. Has a stiffness that feels like spring steel--and an elasticity your hands won't believe! The soft phase of a two-phase material serves simply to cross-link the whiskers of the strong phase, **so that the ultimate strength of perfect crystals can be applied.** That's why human bone displays a strength that actually surpasses stainless steel! It's a two-phase material using calcium phosphate crystals cross-linked with an extremely good protein plastic. "If somebody does that with tungsten whiskers in a matrix of cobalt say...leybrydite has a competitor that isn't dependant on rhenium!"

The point of this: It isn't **Big** business that's good--but **dynamic** business. What's evil about the labour unions is that they are efforts to impose tribalism and stasis..and cartel capitalism is the natural ally of tribal-labour.

"Socialism, with its promise of cradle-to-grave security, and job-assurance and stability, is a purely tribal-type promise; it's exactly what the serf wants. So Socialism, Union Labour and cartel capitalism all have exactly the same objectives --establishing a stable, static, predictable economic system in which no innovations are tolerated."

And so forth, over an astonishingly wide range of subjects in a manner exactly qualified to annoy the holders of received opinions. Sometimes he went over the top; mostly, he left his readers asking themselves, "Can he actually mean what he says", or sometimes, "My God! suppose he were right?" Which state of uncertainty, of course, was exactly the state of indecision Campbell sought to induce in his readers. The precondition for taking up a new point of view is, of course, a readiness to agree that the old one might no longer be valid.

I hope I have succeeded in making the point that in this great iconoclast we have the epicentre of a cultural earthquake of considerable dimensions, the tremors

of which continue to spread outwards today.

Campbell's Golden Age of science fiction started in the summer of 1939 when the magazine issues from July to September featured such new writers as A.E. Van Vogt, Isaac Asimov and Theodore Sturgeon, now famous the world over. Later, they were to be joined by Poul Anderson, James Blish, Fritz Leiber, Harry Harrison and Frank Herbert, to name only the best known.

Some of these authors had had formal training in science; some had not. All of them had absorbed their editor's message about the need to dramatise new discoveries in science, and the results soon became apparent. Heinlein's "Blowups Happen" and Lester del Rey's "Nerves" in 1942 both dealt with the possibility of accidents in nuclear power plants and that was a long time before there was any official admission that such a thing as a nuclear power plant could even exist.

Van Vogt was interested in ways of developing the potential of the human mind, in Spengler's theories of cyclical development in history, and in the mechanisms of political exploitation, all themes which he dramatised. Later, he was to work with L. Ron Hubbard in the development of dianetics, though he dropped out, as did many, when this underwent sharp change into scientology. Dianetics, of course, had its initial boom period when the first-ever article on the subject was published in **Astounding**. As an example of Campbell's influence, I quote from a letter by him² in 1956: he was dealing with the professional opposition dianetics had run into. "I dropped out of the rat-race, and strongly suggested that Ron do likewise, when it became abundantly clear that there was no use trying to accomplish anything that late. It was, as a matter of fact, I, not Ron, who originally suggested that it should be dropped as a psychotherapy, and reconstituted as a religion. Because **only religions are permitted to be amateurs.**"

Hubbard himself had contributed fiction to **Astounding** from 1938 to 1950.

Those who think of him only in terms of human-mind development might note that his novel, **Return to Tomorrow**, was one of the first fictional treatments of the relativistic effects of space-flight. This novel is described in **The Encyclopaedia of Science Fiction** as "perhaps the single most extreme example of the Social Darwinist perspective (in science fiction)"! Like Campbell, Hubbard was some sort of "walking earthquake": it is likely that the end-results of both men's actions will still be working themselves out long after those of us here present have been laid to rest.

I now go over to something less disputatious. James Blish, who came to join the **Astounding** stable in 1950, had studied microbiology at Rutgers, and carried out postgraduate work in zoology at Columbia University, so it was logical that he should introduce to science fiction biological themes formerly rather neglected. Though constitutionally a sceptic, he had a strong interest in religion and once posed the question: "Is the desire for secular knowledge, let alone the acquisition and use of it, a misuse of the mind, and perhaps even actively evil?" This is, of course, a science fiction theme that goes back to Mary Shelley, at least. Blish's answer to the question is supposedly best put in his novel, **A Case of Conscience**, the hero of which is a Jesuit priest. However, I draw your attention to one of his less known works, and the one he himself considered to be his best novel, **Doctor Mirabilis**, the story of Roger Bacon.

I want to quote, not from the novel itself, but from Blish's notes at the end of the book. Throughout what I have said so far, I have been painfully aware that for many of you any acceptance of the mental stimulus of science fiction--at its best, be it understood--must be something you have to take on trust from me. And why should you trust an unsupported statement? Instead, I would like you to consider the following, and to relate it to the thesis of the cultural earthquake:

"It would be hard to find any branch of modern science which was not

influenced by Roger's theoretical scheme; yet by the same token this leaven was so slow-working that I could do little justice to it in the course of a novel..I could not, for instance, say anywhere but here that;

--a passage printed from Bacon provided Columbus with one of his chiefest theoretical props in presenting his case to the Spanish Court;

--Peter the Peregrine's manuscript, **De magnete**, greatly influenced the epoch-making treatise of Sir Francis Bacon's contemporary William Gilbert on the same subject, because Gilbert attributed Peter's conclusions to Roger Bacon;

--the whole issue of the space-time continuum of general relativity is a direct descendant of Roger's assumption in **De multiplicatione specierum** and elsewhere that the universe has a metrical frame, and that mathematics thus is in some important sense real, and not just a useful exercise.

...there is really no way short of another book to convey the flamboyancy of this logical jump, which spans seven centuries without the faintest sign of effort. The most astonishing thing about it, is its casualness; what Roger begins to talk about is the continuum of action, an Aristotelian commonplace in his own time, but within a few sentences he has invented--purely for the sake of argument--the luminiferous ether which so embroiled the physics of the nineteenth century, and only a moment later throws the notion in favour of the Einsteinean metrical frame, having in the process completely skipped over Galilean relativity and the inertial frames of Newton. Nothing in the tone of the discussion entitles the reader to imagine that Roger was here aware that he was making a revolution--or in fact creating a series of them; the whole performance is even-handed and sober, just one more logical outcome of the way he customarily thought. It was that way of thinking, not any specific theory, that he invented; the theory of theories as tools."

Scholar, thinker, fictioneer--there was never anyone quite like James Blish. I

recommend his works to anyone who, not familiar with science fiction, wishes to experience it at its best.

An earthquake need not be of the first magnitude to be important. Let me take the case of Hal Clement, a high-school science teacher, who has created a whole sub-genre in science fiction by describing in minute detail the interactions between human spacefarers and the inhabitants of alien planets, this done with the greatest attention to accuracy in describing the physical conditions and sociologies involved. **Mission of Gravity**, rightly described as one of the best-loved novels in science fiction, describes the problems of aliens helping a human team to recover a vital component from a crashed space probe. Given that the gravity of the planet concerned varies from 3 to 700g (at the poles), the physical complications are considerable, and Clement deals with them with enormous nerve. Anything more different from the early pre-Campbell "space cowboy" story would be hard to imagine. Notice, please, that there is a ratchet-effect here; after the advent of writers like Clement, it became harder and harder for new authors to get away with inaccuracy, or simple laziness, in matters of physics. Invention was one thing; fantasy was another.

Indeed, it is of interest to note that not long before the Second World War, Campbell, finding himself the recipient of fantasy stories which, while of fine quality, could in no way be fitted into the science fiction canon, went to the length of founding another magazine, **Unknown Worlds**, in which to find them a home. It is of no less interest to note that, even in fantasy, he also continued to insist on the same standards of rigour as in **Astounding**. An author wanted to bring in magic: very well, but the magic had to be consistent with its own rules!

Yet fantasy, if I may divert for a moment, has also produced its own earthquakes. To take the obvious examples, both from Great Britain, of J.R.R.

Tolkien and C.S. Lewis, who both demonstrated that the laws of ethics had their own internal rules, and that the working-out of these rules was, in dramatic terms, of the greatest interest and value to an enormous readership. Even the sub-standard imitations which still appear pay tribute to the truth of this, rather along the lines of Oscar Wilde's dictum that "Hypocrisy is the tribute that vice pays to virtue."

It is time to consider what particular cultural earthquakes concern us now, and will in the future. Two very obvious cases involve space-travel and nuclear energy. I have already indicated how long it is since Wells predicted the atom bomb, and since Heinlein and del Rey among others, went into detail on the problems of nuclear engineering. I should mention the now-famous occasion when the FBI called on John Campbell, when the Manhattan Project was still a state secret, to ask, "Where did this author of yours find out these facts about atomic development," and Campbell replied, "From the shelves of the public library where they have long been available." But I would stress that these very accurate predictions appeared in the despised-by-intellectuals pulp magazines, and to suggest that if you want to know what is going to happen next time round, perhaps you should pay less attention to academic journals and more to what is happening on the street.

Space travel has so long been a staple of science fiction that for many who do not study the genre, it is regarded as its sole provender. Certainly, advance information in both fictional and non-fictional form has long been available from science fiction authors, often in surprising detail, and, in recent decades, from authors involved professionally in space developments. Arthur C. Clarke's communications satellite is the paradigm, although we could go back to Tsiolkovsky, Russian space-travel advocate, who wrote a classic paper on the theory of liquid-fuelled rockets, **The Probing Of Space By Means Of Jet Devices**, in 1903.

But it is the continuing earthquake tremors that concern us, rather than just

their effects, and here I must point out that it is not so much prediction of space development in science fiction that is important, but it is the conditioning effect upon the public world-wide, an effect vastly magnified by the moving over of this type of fiction from the printed page to the cinema and tv screens. Indeed, so blas'e has that public become, that rather simple-minded parodies on space travel, such as those of the best-selling author, Douglas Adams, command large sales. For that matter, the dystopian implications of both nuclear developments and space-travel have long been a staple of certain science fiction writers, double-minded though they obviously feel about it. As a small boy, I can remember puzzling over an American magazine story in which Martian and Earth cultures had succeeded in wiping each other out, and something of this feeling is reflected in Ray Bradbury's **Martian Chronicles**, which contains, also, a not-very-subtly-coded message about racialism. Science fiction has long been a vehicle for such messages. Since it would take an entire paper to deal with this aspect of the genre, I shall refrain, saying only that for anyone who wishes to see how science fiction can blend real science, social insight and a viable political message, he can hardly do better than to read Ursula LeGuin's novels, **The Left Hand Of Darkness** and **The Dispossessed**.

I have presented a very brief overview of science fiction in terms of the thesis we are discussing. I must emphasise that science fiction is a particularly pluralist genre, and that such an overview of necessity must omit a very considerable number of "minor earthquakes." You may get some feel for this when I say that the Science Fiction Encyclopaedia, to which I have more than once referred, is a large book, which runs to 672 pages--and that was in the 1981 edition, since then reports of further volcanic eruptions in this area have not been lacking. Also, because I have been stressing the scientific aspects, I have had "to slight" literary and psychological ones in a way which really distresses me. To omit,

for example, any mention of Brian Aldiss' work is rather like leaving out Dr. Johnson from a treatise on English literature, on the grounds that he never dealt with aeroplanes.

I would like to continue with some thoughts about "an earthquake" which I think will begin to be manifest seriously some 10 to 20 years hence. To do this, I have to make a further reference to John W. Campbell, not as editor, but as science fiction writer. He was apt to produce rather sweeping concepts, and I am going to release two of these upon you. With one, you will be familiar; with the other, I think not. Let us take the latter first. It comes from the story "**Forgetfulness**", published in **Astounding** before he became its editor. A character is describing a power generator built by a lost race, "The generator supplied the power for the city, and for the ships of the city, wherever they might be in space. In all the universe, they could draw on the power of that generator. That was the master unit; from it flowed the power of the generator, instantaneously, to any ship in all space, so long as its corresponding unit was tuned. It created a field rotating (and the minds of his hearers refused the term) which involves, as well, time. In the first revolution it made, the first day it was built, it circled to the ultimate end of time and the universe, and back to the day it was built....The power that drove it died when the city was deserted, but it is still making the first revolution, which it made and completed in the first hundredth-of-a-second it existed."

"Because it circled to the end of time, it passed this moment in its swing, and every other moment that ever is to be. Were you to wipe it out with your mightiest atomic blast, it would not be disturbed, for it is in the next instant, as it was when it was built. And so it is, at the end of time, unchanged. Nothing in space or time can alter that, for it has already been at the end of time. That is why it rotates still, and will rotate when this world dissolves, and the stars die out

and scatter as dust in space."

Since I am not a physicist, I can but invite you to reflect on this concept, and to decide whether it contains any inherent self-contradictions. An obvious objection is that it does not meet the Popperian criterion of being able to be disproven. But how do we show that?

Now we come to a concept which Campbell did not invent, but he was, to the best of my knowledge, the first science fiction author to dramatise in fictional form the Heisenberg Uncertainty equations. This he did in a serial published in **Amazing Stories** in 1936, called "**Uncertainty**", later published in **Daw Books** as **The Ultimate Weapon**. Though the details are interesting, I will not dwell upon them, because the point I want to establish is that Campbell introduced to the general public the fictional possibilities attendant upon a whole new way of looking at the physical universe. The psychological possibilities he left alone. It was not until he became editor of **Astounding** that he was able to get the kind of writer who could pick up on relativistic effects as they affected human behavior. In particular, I refer to the idea of alternative worlds, introduced by Murray Leinster in 1934 in **Astounding**, before Campbell took over the editorship, in the story "**Sidewise In Time**." The idea as such was not new. What was that underneath this fantastic idea a platform of mathematics and philosophy was soon to be structured. I refer of course to quantum physics, which tells us--I quote from an article in **Physics Today**, September 1970, "**Quantum Mechanics and Reality**," by Bryce S. Dewitt, "The universe is constantly splitting into a stupendous number of branches, all resulting from the measurement-like interactions between its myriads of components. Moreover, every quantum transition taking place on every star, in every galaxy, in every remote corner of the universe, is splitting our local world on earth into myriads of copies of itself."

The implications have not been lost on philosophers. Here is a passage from David Lewis' **On The Plurality Of Worlds**, he is, of course, referring to alternate worlds: "I am agnostic about whether there are discernible worlds. If there are, I myself would wish to say that there are indiscernible ways a world could be, just as I would say that a world of two-way eternal recurrence affords countless indiscernible ways-one per epoch-for a person to be. But others might not like the idea of indiscernible 'ways'. They might therefore welcome a guarantee that, whether or not worlds ever are indiscernible, 'ways' never will be."

You can see that, mathematically or philosophically, we are getting into some rather heavy weather. My point is that in these matters the ratchet effect is well under way, and the time has passed when all this could be dismissed as "mere speculation." We are, I think, at a point about equivalent to that of atomic physics around 1937, concerned with something of enormous interest to physicists and social thinkers, but considered still to be beneath the attention of politicians, generals, or economists. Certainly, it is not beneath the attention of the reader in the street, since to day there is a positive surfeit of stories and novels making use of alternate-world scenarios. My view is that once the basic structure of mathematics and philosophy have been built around an idea, then, no matter how bizarre that idea, the actual real-world (**our** real-world!) demonstration of the idea is just a matter of time. And perhaps not very long time.

Consider how brief was the interval between those atomic theories of 1937 and the dropping of the atomic bomb on Hiroshima in 1945, and then consider the political implications of making available to the public accessibility to the plurality of worlds. All political and economic control depends on the power of the establishment to create and maintain a scarcity situation. With only one world, and an exploding population therein, the reign of force by monopoly power is inevitable.

But suppose, just suppose, the gateways to those other worlds were thrown open!

Very tempting, you may say--but just theory, all the same. There are two replies: one, is to remind you that, right up to the very second that the United States exploded its first test bomb, there were those in the highest positions who still considered the whole thing utter poppycock. The other is to point out that there is in operation today, and has been for some years, an alternate-world application that is not in the least theoretical. Scientifically, they may be in error, but that is irrelevant. What I am speaking of is a reality in the social world. And this means that, as far as their own lives and mental existence are concerned, these people live a multiple-choice existence. "All in the mind," you may say, but have you considered the mental choices only, and one with an unlimited range of choices? It is the difference between freedom and slavery. Consider: instead of dropping bombs on Libya, might not the American government have come nearer its objectives by dropping a few thousand copies of a popular treatise on quantum physics?