

The So - Called Fourth Dimension

By L. Sprague de Camp

You've read "time-travel" stories, and "fourth-dimension" tales, no doubt. Here's an article on what data we really have on the subjects.

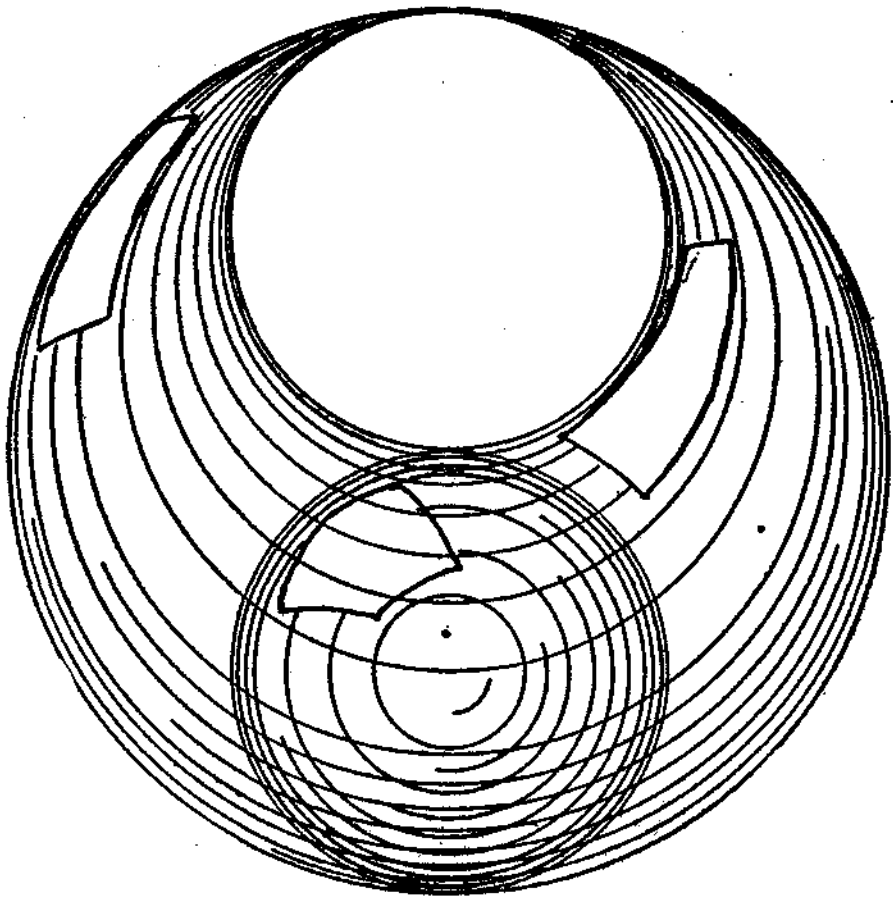
PEOPLE WHO believe in the reality of prophecy sometimes explain it on the theory that "Time" is the Fourth Dimension and can therefore be seen or moved along as if it were a length. For almost a century this Fourth Dimension has been a favorite foible among the pseudo-scientific. Every now and again you hear that it's "Time," that it's perpendicular to the three dimensions of space, or that it is so mysterious that only the leading mathematicians of the world understand it.

None of these things, however, is true. First of all, there is no such thing as *The Fourth Dimension*, at least in science. The difficulty lies in the fact that laymen and men of mathematics mean different things by the word "dimension". A layman thinks of a *spatial* dimension, that is, length, breadth, or height. A mathematician, on the other hand, uses the term to mean *any measurable attribute*, such as age, density, wealth, or number of wives.

The idea of considering "time" as a (not *the*) fourth dimension was proposed by the French mathematicians Lagrange and d'Alembert in the Eighteenth Century. These savants suggested that certain problems in analytical mechanics—as sober and dull a science as you can find—would be simplified by considering bodies as moving in a manifold, or working combination, of four dimensions, of

which three were spatial dimensions and the remaining one "time." It makes no difference whether you take your "time" as the first or the fourth dimension, so long as you do not change the order in the middle of the problem. You describe an airplane's position in four dimensions when you say it's 5,000 feet north of the control tower, 1,000 feet east, and 500 feet up, at 12:46 p. m. If you want to include the volume of fuel in the tank as the fifth dimension, that's perfectly all right too. About the fourth dimension, as you see, there's really *no* mystery at all. No competent mathematician—including Professor Einstein—ever advanced the claim that "Time" was *The Fourth Dimension*, or that it was a spatial dimension perpendicular to the other three. If you think that you can erect four spatial dimensions, all at right angles to one another, try it with four pipe-cleaners. As for the non-Euclidian geometry of Lobachevski and Riemann, and Professor Einstein's curvature of space, those are quite separate problems, despite the fact that they are sometimes confused with the idea of four or more dimensions.

Pseudo-scientific Fourth Dimensionalism—something quite different from analytical mechanics—started in the last century. One of its early leaders, the astronomer Prof. Johann F. C. Zollner of Leipzig, confused the



Tesseract, or four-dimensional object, according to the vision of the orientalist and occultist, Van Manen.

fourth dimension of analytical mechanics with the Kabbalistic and Theosophical idea of a multitude of planes of existence, all occupying the same space but not interfering with one another. Zollner, beginning to show signs of a mental breakdown, undertook to prove the reality of his "Fourth Dimension" with the help of "Dr." Henry Slade, an American medium whose stable of spirits loved to write upon slates. The astronomer coaxed three of his colleagues to join him in the tests. Of these, two suffered from defective vision (one poor man being nearly blind); the remaining professor was seventy-four, and, you may guess, not so observant as once he had been. About professional

conjuring none of them knew a thing.

At the first seance, in '77, Slade tied knots in a cord, both ends of which were, according to Zollner, secured the entire time. He also, it's said, took coins from cardboard boxes without, as most men must, opening the boxes first. The crucial experiment was to have been the linking together of two wooden rings—solid rings—which, thought Zollner, would prove the power of mediums to enable matter to interpenetrate by rotating it through the "Fourth Dimension." (If you don't know what that means, I don't either.) But all Slade did was to string the rings on the leg of a little table. Other tests proposed, such as reversing the twist

of a snail-shell, Slade declined or evaded.

Nevertheless poor Zollner thought that he had his proof, and wrote it up as *Transcendental Physics*. Then he went mad and had to be confined. Subsequently the Seybert Commission of the University of Pennsylvania exposed Slade's slate-writing tricks as ordinary sleight-of-hand; in 1882, Slade fully confessed to these impostures.

THE NEXT GREAT LEADER

of pseudo-scientific "Fourth Dimensionalism," the English-born inventor, and teacher of mathematics, Charles Howard Hinton by name (1853-1907) wrote books on the notion of four spatial dimensions and ended his days as a U. S. Patent Office examiner. Hinton, hardly a scientist in any strict sense, confessed that at Oxford he'd found the sciences very difficult, and that the real purpose of his "Fourth Dimensionalism" was to provide a basis for faith and morality.

Hinton's arguments were analogical, not scientific. He claimed that a two-dimensional creature, perfectly flat with no thickness whatever, would be confined to a surface and therefore could not know the third dimension which to us is obvious. A line on this surface would be a barrier as insurmountable to the "Flatlanders" (as he called them), as would be a wall of infinite height to us. Our ability to cross this line would impress the two-dimensional beings as a supernatural feat. Therefore there must be a "fourth dimension" of which we, limited to three dimensions, are unaware, and a fourth-dimensional being would seem supernatural to us.

Hinton filled his books with diagrams to teach people to think four-dimensionally, and invented a class of four-dimensional solids called "tessaracts", to which he gave such impressive names as "hyperspheres" and "pentahedroids". He even wrote a novel, *An Episode in Flatland*, about a race of two-dimensional ani-

mated triangles who lived on a disk-shaped planet—though Lord Dunsany made more entertaining use of a similar idea in *The Charwoman's Shadow*. Hinton's works are moderately entertaining as fantasy; the trouble arises when people insist upon taking them seriously. Actually no-one has ever seen a two-dimensional object, or erected four perpendiculars about a single point. The nearest anybody has come to modelling a tesseract was the vision of a hypersphere which the orientalist Van Manen said that he saw while lying in bed. The figure, an ordinary sphere whence two curved and tapering horns projected, meeting at their tips, comprised a shape between a doughnut and a crescent. (See the cut.) The figure is of course not itself Four-Dimensional, but is supposed in some occult way to convey the impression of Fourth-Dimensionality.

A select band of pseudo-scientists long continued to exploit the "Fourth Dimension"—in the Zollner-Hinton, not the scientific, sense. Perhaps the most aggressive of this fraternity was the emigre Russian occultist P. D. Ouspensky, who until his death a few years ago held forth to his little circle of seekers in rural New Jersey. Ouspensky's *Tertium Organum* was intended to finish the series of logical treatises begun by Aristotle's *Organon* and continued by Francis Bacon's *Novum Organum*, to revolutionize the outlook of mankind, and to guide our thinking forever more. I doubt, however, whether any of these ambitious goals will be realized.

In the *Tertium Organum* and its companion, *A New Model of the Universe*, the author advances arguments based upon Theosophical occultism and Hintonian pseudo-science, and gives vent to his many dislikes, including democracy, coeducation, Darwinism, Positivism, the Metric System, social reform, and phonetic spelling. He gives a much muddled explanation of how motion in the "Fourth Dimension" has to do with molecules and

atoms, and is exemplified by snow-flakes, thermal expansion, and the growth of organisms, despite the "erroneous ideas" of modern scientists on these subjects. This dimension is also "Time"; but since "Time" is really a spiral (by which I think he means a helix) it must have three dimensions of its own, so that six dimensions in all exist. Ouspensky believes in reincarnation, but in a most peculiar sense: when you die you go back to the beginning and thus lead the same life over and over. His erudition does not prevent his filling his book with wild misstatements like: "*Present-day science takes the Sphinx to be prehistoric.*"

THE BRITISH ARMY OFFICER

John W. Dunne, another "Fourth Dimensionalist," was also an airplane pioneer and the author of some excellent children's fairy-tales. Between 1905 and 1913 Colonel (then Lieutenant) Dunne built several of the first British airplanes, tailless machines with sharply swept-back wings. Although they are said to have flown quite well, their creator soon retired from aeronautical work. In 1927 he published *An Experiment with Time*, which advanced the theory of "Serialism". He erected this hypothesis upon the rather shaky basis of prophetic dreams, some of which he said he recorded before the things that he dreamt of happened. In one case, for instance, he had the dream of being chased by an angry horse; next day, sure enough, he was chased by an angry horse.

Dunne undertook to explain prophetic dreams by asserting that we "move" along the "Fourth Dimension of Time"—another argument by analogy, since "move", in the literal sense, refers to spatial motion only, whatever it is that we do in "time". The dreams are supposed to be sent to us by a higher-order "observer", of which we are a part, and, since it takes time to travel in "Time", there must

be a still higher-order—a Fifth-Dimensional—"Time", in which lives an observer of still higher order, and so on.

Dunne's arguments by far-fetched analogies are but an up-to-date version of the old notion of the philosopher Parmenides that all events, past, present, and future, coexist in an "eternal now", and that a prophet can "see" past and future events by his extra-sensory faculties, as though they were in the "present". This idea, however, has strong logical objections, one being that if you can "see" a future event, you ought to be able to take some action to prevent this event from occurring; and if you do that, the event didn't exist in the future to be foreseen in the first place. Moreover Dunne's prophetic dreams are by no means established as facts. An effort by the British Society for Psychological Research to reproduce them in 1932, using forty-two subjects, failed.

If despite all reasons to the contrary, you assume that "time" is a kind of spatial dimension, and that you can "move" along it, why can't you travel in "time"? This is of course the familiar "time-travel" plot of the science-fiction story.

A DIFFERENCE, HOWEVER, exists between "time-travel" backwards (to an earlier date) and forwards. "Time-travel" forwards may be considered a development of the old Rip Van Winkle story-plot, which goes back to a tale that was told of the Greek philosopher Epimenides and probably earlier. It presents no insurmountable logical difficulties, because you can easily imagine a person somehow anesthetized or disintegrated for the needful interval and then revived. Benjamin Franklin expressed the wish that he could be pickled in wine for a century, then awakened to see what had happened while he slumbered.

Backwards "time-travel," on the other hand, involves worse paradox-

es than those of prophecy. These may be summarized by the question: "What would happen if you went back for fifty years and slew your own father before he begat you?" To put the objections more exactly, such "time-travel" would mean violating Aristotle's third law of logic—that, of two contraries, both cannot be "true" at once. Not even such daring modern logicians as Korzybski and Brøuwer have found themselves able to dispense with this principle, though they have developed self-consistent systems of logic without the other laws of Aristotle.

Suppose, for instance, that I travel backwards in "time" just one day. Then, at noon, I enter the room wherein I was writing this piece, and slap myself on the back. But I know perfectly well that yesterday noon *no de Camp* double came in and slapped me upon the back. Therefore this slapping would have to be both "true" and "false" at once.

The "time-travel" plot appeared first (as far as I know) in Dickens' *Christmas Carol*, and then in many stories published in the 1880's and 90's including Mark Twain's *Connecticut Yankee* and Wells' *Time Machine*. Since then writers have published hundreds of such stories and have imagined scores of devices for "moving" the traveller and for glossing over the paradoxes of "time-travel." In one story the party went to the North Pole and flew round and round it withershins, losing a day with each circuit. Arrived in the past the voyagers may or may not change future history. Maybe an opportune accident stops them from doing so; sometimes they change it but are destroyed in the process; sometimes they start a new alternative branch of history that coexists with the old.

The logical hazards of backwards "time-travel" deter all but a few folk from taking it seriously. However the celebrated "Versailles Visions" of Anne Moberly and Eleanor Jourdain have actually been presented as a

journey into the past. These two intellectual English spinsters claimed that in 1901 they visited the Petit Trianon at Versailles, France, and there stepped back into the 18th century, complete with Marie Antoinette. They passed gardeners and other employees, one of whom gave them directions. They saw an evil-looking pock-marked man in a cloak, and later passed an oddly-dressed woman sketching. The whole time they were oppressed by a feeling of strangeness and noted the singular solitude and quiet of the grounds, and then—they stepped back into the 20th century again.

Later they compared their recollections and, becoming infatuated with the idea of a visit to an older and supposedly more glamorous day, embarked upon a lengthy investigation of the condition of the gardens in former times. From various clues they picked August 5, 1789, as the date to which they had gone back. They also believed they had identified all the people they had seen: the sketching woman as Marie Antoinette, the pocked man as her sinister friend the Comte de Vaudreuil, and so on. Their story was published as the book *An Adventure*, first pseudonymously and later under their own names, and has been re-told several times in magazine articles.

BUT DURING THE 1930's R. J. Sturge-Whiting, an Englishman interested in psychic research, reviewed the whole case, went over the Petit Trianon grounds, and learned that the Misses Jourdain and Moberly had been the victims of a vast self-deceit. Having fallen in love with a transcendental explanation of their adventure, they had gone to enormous trouble to hunt up facts that seemed to bolster this interpretation, whereas a fraction of the effort spent upon finding rational reasons for those events would have quickly exploded the theory. There were numerous holes

in their story: for instance, inconsistencies between the statements of the two women, and between their original notes and the published account.

Sturge-Whiting disposed of their other points just as ruthlessly: the various scenic features that they said no longer existed, he found still extant. Thus the "kiosk", a small ornamental marble structure they had made much of, he showed to be but a confused recollection of the Belvedere and the Temple d'Amour, the latter mis-remembered as occupying the site of the former. And the people seen were ordinary 20th-century workers and visitors.

Evidently Omar was right when he said:

*The Moving Ringer writes; and,
having writ,
Moves on: nor all your Piety
nor Wit
Shall lure it back to cancel half a
Line,
Nor all your Tears wash out a
Word of it:*

Perhaps that is just as well. No doubt we should all like a chance to perform some former action over again and differently. But, as if there weren't enough things (including the Big Bang) to worry about, think what it would be like if somebody in *our* future were likely at any time to go back into *our* past, alter history, and, in the process, snuff us out like candles!
