AFTER THE FALL: FROM ADAM AND EVE TO APPLES AND ELEVATORS

C V VISHVESHWARA
Indian Institute of Astrophysics
Bangalore - 560 034
INDIA

I have often wondered why anyone in his right mind would want to listen to a talk after good food and drink. The only explanation I could come up with was that after all that food and drink one is not in his right mind. But, then, why would anyone in his right mind want to give a talk after good food and drink? After all, you cannot drink properly since you have to remain at least half sober. You cannot eat well with hundred butterflies that flutter by in your stomach. Well, there are reasons. For instance, the cynical reason: if you are giving an after-dinner-talk, you do not have to listen to one. The Freudean reason: an after-dinner-talk is in all probability the post-prandial manifestation of your sado-masochistic relations with your colleagues. In my own case the reason was simple. To the best of my knowledge, the last after-dinner-talk arranged during a gravitational conference by IUCAA was given by none other than yours truly. How could I pass up such a unique opportunity to give two after-dinner-talks in a row. Oscar Wilde might have called it carelessness, but Mr. Guinness may put it down in his book as some kind of a record.

It is not easy to make one after-dinner-speech; it is extremely difficult to make two; and it is impossible to make two that are linearly independent. To simplify matters, therefore, I shall invoke a powerful theorem called the Food Theorem, erroneously attributed to Epicurus. The title of the theorem reads in Latin:

Cibaria speculatio.

In Greek it is:

περὶ τροφῆς τε καὶ λαλιᾶς
ἀποδεικτικὸν θεώρημα

Perì trophês te kaì laliâs
apodeiktikòn theórema

Which is a mouthful as a food theorem ought to be. It also goes to show that the ancient Greeks talked a lot and therefore became successful philosophers. The theorem states in Latin:

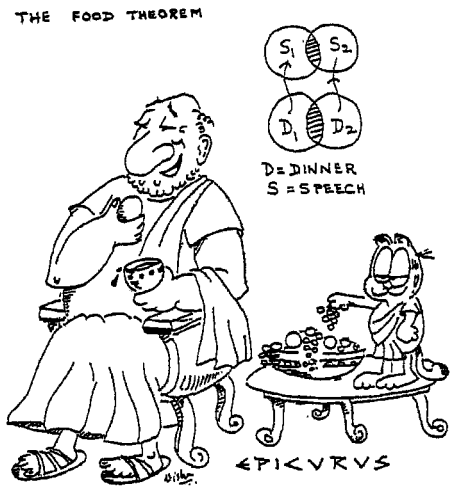
Cibum inter et sermonem correlatio valida est.

In Greek:

τῆς τροφῆς μετὰ τοῦ
λόγου συγκαταλληλότης βεβαία

Tês trophês metà toû lógou
sygkatallelótes bebaia

Let me translate this into plain English for the benefit of the underprivileged, including myself, who have not studied Greek and Latin. The theorem simply states: 'There is strong correlation between food and speech'. A modern corollary of this theorem is that if two dinners represented by two closed sets have a non-zero intersection, then they are mapped onto two after-dinner-speeches, represented hopefully by two closed sets, that also have a non-zero intersection. I find that the two dinners definitely have non-zero intersection with common elements like rice, dal, roti and so on. Therefore my two speeches will also have non-zero intersection. Maybe the two will turn out to be isometric to each other, who knows.



As I mentioned in my earlier after-dinner-speech, a memorable occasion which I am sure has been totally forgotten, I have carried out some gedanken research on the origin and evolution of after-dinner-speeches. Please do not mistake gedanken research for gedanken experiment. The latter is only thought experiment. On the other hand, gedanken research, abbreviated to GR, is thought research which begins in thought, proceeds in thought and ends in thought. It need not have anything to do with reality. If you want to see shining examples of gedanken research, all you have to do is open the pages of any journal of theoretical physics. And the results of gedanken research will overflow in super abundance.

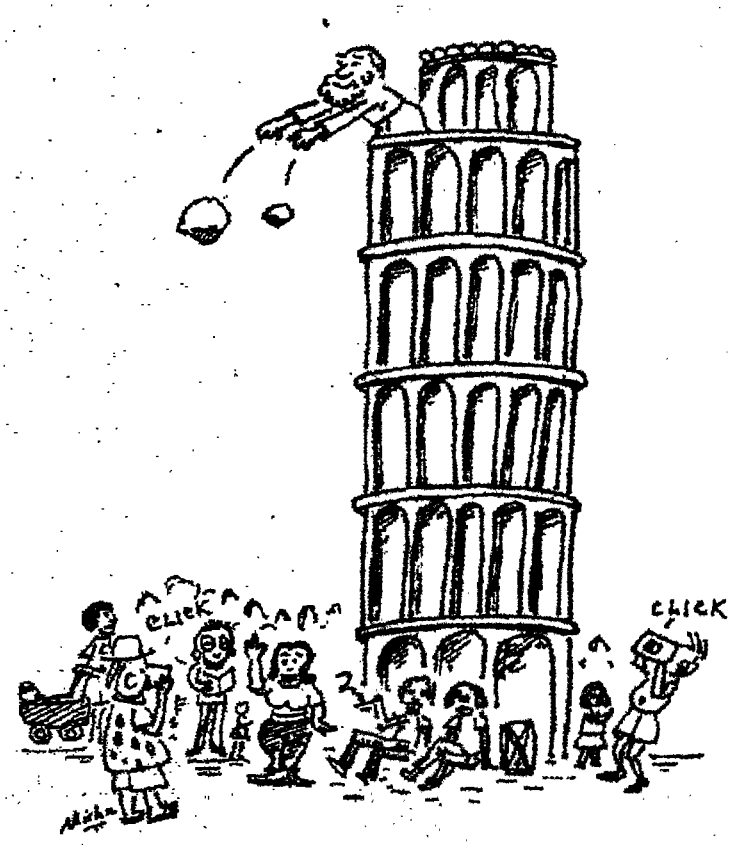
My gedanken research has revealed that the institution of after-dinner-speech originated in the year 97 AD during the reign of the Roman emperor Marcus Crocceius Nerva. It started out actually as before-dinner-speech. A hapless Christian was chosen to make a before-dinner-speech, that is before he became dinner to the lions. Under the circumstance, the speech tended to be disordered and disjoint and therefore long. So much so, the lions lost their appetite and hence this practice was discontinued.

This noble institution was revived as genuine after-dinner-speech in the fifteenth century by the splendid brother and sister team of Cesare Borgia and Lucrezia Borgia, who are reputed to have mastered and practised the fine art of poisoning people. A typical menu at their table would have consisted of an antipasto garnished with arsenic, a saltimbocca alla Romana spiced with cyanide and accompanied by a delicate salsa of strychnine, all this rounded off with a shot of benedictine laced with belladonna. What is belladonna? Ambrose Bierce, the American journalist, has an entry on this in his wonderful book *The Devil's Dictionary.*

Belladonna: In Italian a beautiful lady; in English a deadly poison. A striking example of the essential identity of the two tongues.

This kind of menu ensured that the after-dinner-speech was quite brief. No wonder then that this institution became a dreaded instrument of intimidation widely used by the Italian carabinieri, the Spanish inquisition, the Russian KGB, the American CIA and hopefully not by the Indian IUCAA.

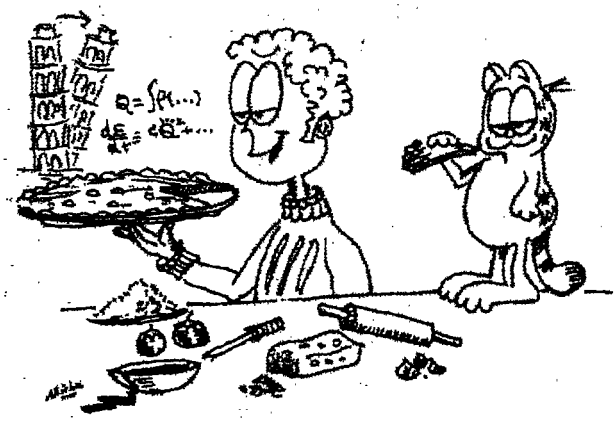
Georgio De Santillana, in his book *The Crime of Galileo* , describes how Galileo was shown the instruments of torture to make him say that the sun goes around the earth. Had he been threatened with an after-dinner-speech, he might have repudiated the equivalence principle as well. In which case, there would have been no Eötvös, no GR and no us. A wish devoutly to be consummated or a consummation devoutly to be wished or whatever. May Prince Hamlet rest in silence and let us continue. Galileo did discover the equivalence principle by throwing around things from the top of the tower of Pisa endangering the lives of tourists below clicking away their Yashicas and Minoltas. Did he really? This is disputed by some historians of science. Apparently, there exists sufficient evidence to prove



that Galileo suffered from double hernia and had to wear a special kind of belt and therefore could not have climbed up the tower to perform his experiment. Perhaps people in experimental gravitation could verify this. Belts of different materials could be worn since equivalence principle is involved. On the other hand, there is strong theoretical evidence, albeit circumstantial, to show that Galileo did perform his experiment. Whereas he had himself formulated Newton's first law of motion, he had not read Newton's third law. As a result, when he carelessly threw things from the tower of Pisa, there was an equal and opposite reaction and the tower leaned to the other side. This proof is available *post facto* even to this day.

All this is well known. But what is not known and only gedanken research has revealed is the hitherto unknown existence of Galileo's Hungarian graduate student by the name Zolta Zbznzky, a name with four z's. Like all good thesis advisors, Galileo asked Zolta to work on a problem he himself could not solve. He asked Zolta to compute the radiation reaction as the quadrupole moment of the tower of Pisa changed suddenly when it leaned to one side. Zolta wanted to do this using the 4.37th order, or it could be 4.73rd, PPN formalism. That is Plagiarized Post-Nostradamus formalism which had tremendous predictive power having been formulated by Nostradamus himself. The orders were irrational because the formalism itself was a bit irrational. This was a formidable problem indeed. Zolta's motto was: Solve a solvable problem rather than unsolve an unsolvable one. Therefore he decided to construct a two-dimensional toy model. The two-dimensional analogue of the tower of Pisa, which is a cylinder in three space, is a disk. Zolta made a disk and whirled it to simulate gravity. But no takers. Then Zolta made his first discovery. He realized that his toy model could become more palatable if he baked it, along with his half-baked ideas, with tomato sauce and cheese. He named it after the town in which it was discovered replacing the s with two z's from his name and called it Pizza. Now his toy model sold like, what else, pizza. The demand was so great that Zolta had to sell it by slices. Now he made his second discovery. When he had sold one slice, he realized that he could not go round the disk through an angle of two pi. People were puzzled wondering why Zolta was talking about two pies when he had only one. Anyway, Zolta claimed that this represented, for some unknown reason, an erotic cosmic g-string, 'g' standing for gravity and 'erotic' being the abbreviation of 'heterotic'. Some people said Zolta was into string theory. Some said he had gone mad. And some unkind ones said what is the difference. Seeking greener pastures or what is popularly known as the green card, he migrated to Las Vegas, along with his toy model and g-string and all, and became godfather to generations of general relativists.

Zolta's toy model was the precursor to a variety of culinary models to



follow such as the frugal Swiss cheese model, the gooey Polish doughnut model and the robust bini or the Russian pancake model which has been successful in simulating all structures in the universe including the Eiffel Tower.

Let us pass on. That is Galileo passed on. He passed on in the year Newton was born. There is a viable alternative theory which claims that Newton was born in the year Galileo passed on. Such controversies are best left to the historians of science.

Newton's arrival was announced by Pope. Not the Pope in the Vatican, but the poet Alexander Pope. Pope, we are told, was a child prodigy who, at a tender age, was given to lampooning others in verse. When severely chastised by his father, he exclaimed:

> Papa, papa, pity take,
> No more verses shall I make.

Thus, he had made and broken a promise simultaneously. This was of course before the advent of the special theory of relativity which destroyed simultaneity. His father gave up and Pope's verse became worse and worse until he wrote:

> Nature and Nature's laws lay hid in night:
> God said, 'Let Newton be!' and all was light.

This is odd. How can Nature hide in the night which is part of Nature to begin with. In any case, by these lines Pope must have meant that Newton wrote his *Opticks*. Probably he was unaware that Newton had also discovered the universal law of gravitation. This law says, if you have forgotten, that the force of gravitation between two objects is directly proportional

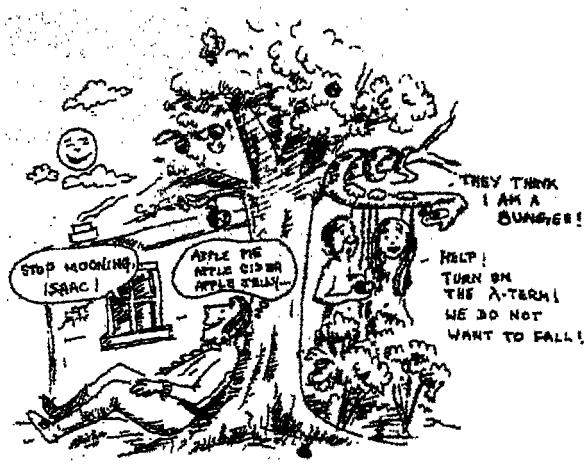
to the ratio of their masses and inversely to the square root of the distance between them. It seems that Newton nowhere wrote down his law of gravitation in a straightforward manner in his *Principia.* However, Ambrose Bierce has a kind word to say about gravitation in his *Devil's Dictionary.*

Gravitation: The tendency of all bodies to approach one another with a strength proportioned to the quantity of matter they contain - the quantity of matter they contain being ascertained by the strength of their tendency to approach one another. This is a lovely and edifying illustration of how science, having made A the proof of B, makes B the proof of A.

The discovery of the law of gravitation was inspired, as every school child knows, by the fall of an apple. Isaac D'Israeli, father of the once British Prime Minister, Benjamin Disraeli, noted that 'the apple struck him (Newton) a smart blow on the head'. On the other hand, Newton's first biographer Sir David Brewster had a different angle. 'I have not been able to find any authority for it' he declared, thereby dismissing the entire episode of the falling apple. He did admit, nevertheless, the existence of the apple tree which, he reported, was badly decayed by 1814 and later destroyed by the wind. But, Augustus de Morgan, distinguished for his contributions to logic and mathematics and even more distinguished on account of his birth in Madurai, India, had his own thrust to make at Brewster. 'One particular tree at Woolsthorpe has been selected as the gallows of the apple shaped goddess: it died in 1820', he wrote, 'But Sir D. Brewster brought away a bit of root in 1814, and must have had it on his conscience for 43 years that he may have killed the tree'. Mr. Turner, the manor owner, is said to have preserved part of the apple tree in the form of a chair. The chair, with such an inspiring lineage, must have no doubt imparted, to all those who sat on it, knowledge *a posteriori.*

Earlier, Voltaire had written about the falling apple in his *Essay on the Civil War in France.* His source of information was Catherine Barton. Who was Catherine Barton? She was Newton's favourite niece, daughter of his half-sister. Reputed to be charming and intelligent, her beauty had been unmarred by the bout of small pox she once had. During her illness she had received medical advice from her celebrated uncle who suggested a remedy consisting of 'warm milk from ye cow'! The irreverent poets of the Kit-Kat Club of the Whigs wrote of her:

> At Barton's feet the God of love
> His Arrows and his Quiver lays,
> Forgets he has a Throne above,
> And with his lovely Creature stays.



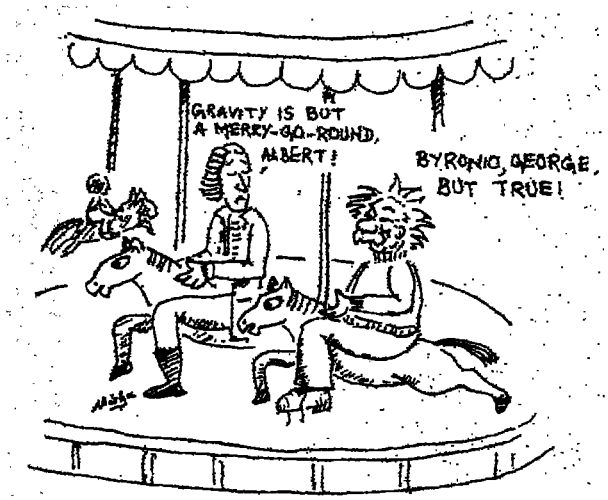
Catherine Barton's name was amorously linked with Charles Montague, Earl of Halifax, who appointed Newton Master of the Mint. Voltaire remarked on this account, 'I thought.... that Newton made his fortune by his merit.... No such thing. Isaac Newton had a very charming niece who made a conquest of the minister Halifax. Fluxions and gravitation would have been of no use without a pretty niece'. However, we are assured by historians that this charge is quite baseless, since Montague was not even aware of Catherine's existance when he made the appointment.

The apple. The fall. There seems to be a strange connection between the fruit and the phenomenon. After all, it was an apple that caused the fall of Adam and Eve. Then again, it was the fall of an apple, thousands of years later, that led to the discovery of the law of gravitation.

The two events were celebrated by Lord Byron in his *Don Juan:*

When Newton saw an apple fall,
he found....
A mode of proving that earth
turn'd round
In a most natural whirl, called
gravitation,
And thus is the sole mortal
who could grapple
Since Adam, with a fall or
with an apple.

Byron's unusual notion - 'a most natural whirl, called gravitation' - indicates that he was way ahead of Einstein in identifying gravitation with accelerated frames.



Einstein's arrival was announced in 1926 by Sir John Squire who wrote:

Nature and Nature's laws lay hid in night:
God said, 'Let Newton be!' and all was light.
It did not last: The Devil howling 'Ho,
Let Einstein be,' restored the status quo.

While Einstein's relativity introduced revolutionary ideas like the fourth dimension, spacetime and all that, radical changes were taking place in art and literature as well. Gertrude Stein was holding her soirees in which artists and writers discussed new ideas including those of Einstein. Gertrude Stein herself wrote perhaps somewhat vaguely. Jacob Epstein was creating his modernistic sculptures. And of course Einstein was putting forth his novel ideas. All this was summed up in a limerick attributed to none other than Einstein himself:

In a notable family called Stein,
There was Gertrude, and Ep, and then Ein
Gert's writing was hazy,
Ep's sculpture was crazy,
And nobody understood Ein.

Nobody might have understood Ein, but his relativity was used for all sorts of purposes. For example, in 1921, the bending of light rays was used in a New York Times editorial with the heading *Relativity at City Hall?:*

'... the rays of logic emanating from the Mayor's office are bent as badly as Einstein's rays... And a man who annihilated space may be able to

provide our municipal government with some happy thoughts on the rapid transit system'.

Actually, relativity and the geometry associated with it had considerable impact on art and literature. For instance, Jean Metzinger wrote in his essay *Du Cubisme:*

'If we wished to tie the painters' space to a particular geometry, we should have to refer it to the non-Euclidean scholars; we should have to study, at some length, certain ones of Riemann's theorems'.

The melted watches in Salvador Dali's painting *Persistence of Memory* represented warped time. He discussed the framework of non-Euclidean geometry and Einstein's theories in his book *The Conquest of the Irrational* and described his watches as the 'extravagant and solitary Camembert of time and space'. In his rather unusual book, *50 Secrets of Magic Craftsmanship,* Dali also spoke of geodesics on the body of a model as equivalent to the volume occupied by the model, a familiar spacetime representation in general relativity:

'The apprentice's Secret Number 22 is that of the drawing of the geodesic lines of his model. Nothing will reveal itself more useful for the understanding of the mysteries of the nude figure than the knowledge to be derived from the assiduous practice of this method. Preferably you must choose a plump model, the curves of whose flesh are as turgescent as possible. The best poses for this are the recumbent ones. You need a provision of strings of black cotton which have been previously soaked in linseed oil to which venetian turpentine has been added, in a proportion of five to three. These strings should be hung up the day before using them, so that they may drip off the excess oil, but without drying altogether. Once the model is lying down in the pose which you desire you begin cautiously to lay the strings on the model's body in the places where you wish a clearer indication of the forms. The curve which these strings adopt will naturally be the geodesic lines of the surface which you want made clear. You may then draw your nude, but especially these geodesic lines which, if they are in sufficient quantity, will suffice - even should you efface the nude - to imprint its absent volume'.

As in the case of art, many writers were influenced by relativity. William Carlos Williams in his poem *St. Francis Einstein of the Daffodils* hailed Einstein as a saviour bringing freedom from the 'dead and old fashioned knowledge'. He stressed the need to incorporate relativity into poetry saying,

'Do we think we stand outside the universe?.... Relativity applies to everything'.

There is a lovely passage in William Faulkner's *The Sound and Fury* where he invokes the possibility of light returning to the earth after travers-

ing a curved space allowing people to see the past. Quentin, who wishes to escape time, muses:

'It was a while before the last stroke ceased vibrating. It stayed in the air, more felt than heard, for a long time. Like all bells that ever rang still ringing in the long dying light rays....Like father said, down the long and lonely light rays you might see Jesus walking'.

And there is the beautiful poem *Any Size We Please* by Robert Frost depicting the cosmic loneliness of an infinite Newtonian universe as compared to the comforting, closed space of Einstein:

> No one was looking at his lonely case;
> So, like a half-mad outpost sentinel,
> Indulging an absurd dramatic spell,
> Albeit not without some shame of face,
> He stretched his arms out to the dark of space
> And held them absolutely parallel
> In infinite appeal. Then saying "Hell",
> He drew them in for warmth of self embrace.
> He thought if he could have his space all curved,
> Wrapped in around itself and self-befriended,
> His science needn't get him so unnerved.
> He had been too all out, too much extended.
> He slapped his breast to verify his purse
> And hugged himself for all his universe.

All this science, all this art and all this literature were enshrined in one letter with two subscripts: Gee-mu-nu!

It is the same Gee-mu-nu that guided Richard Feynman to the right venue of GR meeting which was being held at the University of North Carolina in Chapel Hill. This story has been alluded to by my distinguished predecessor Prof. Engelbert Schucking who made the after-dinner-speech at GR-12 in Boulder, Colorado in the year 1989.

Incidentally, at that time Feynman's name came up in the context of gender equality. Prof. Neeman conveyed the suggestion that names like his and Feynman's should be changed, since 'man' in their names is manifestly masculine. Feynman's name, for instance, should be modified to Feynperson. My daughter Smitha, who was fifteen at that time, pointed out that this is a sneaky, second order male chauvinism, because 'person' contains the subset 'son' which itself is masculine. The name should therefore be Feynperchild.

Coming back to the original story, in order to identify the correct locale of the GR meeting, Feynman apparently asked the taxi dispatcher at the

airport whether a whole lot of guys with their heads in the air and mumbling 'Gee-mu-nu, gee-mu-nu' were going to the same place. And the taxi dispatcher who had come across such a group directed Feynman to the

GR-THEN

correct destination.

If Feynman were to make such an enquiry today, he would draw a blank. Gee-mu-nu is hardly mentioned any more. On the other hand, the dispatcher might inform Feynman that he had spotted a motley crowd of very strange people belonging to diverse walks of life heading in fact towards the same destination. For instance, the dispatcher might recall that there was this bunch of bird watchers who were chattering away about chirps, planning to filter the chirps like coffee or tea and to employ four or five detectives - detectors they said - to find out all about the source of these chirps. A fierce gang of homicidal maniacs raving about killing - working on killing fields, constant killings, seeking new killing horizons and nullifying some killing victor - God knows who he might be. A band of confused taylors worried about strings, loops, knots and trousers - their topology and bottomology. But not a word about stitching, so much so, whatever they put together probably fell apart pretty fast. And you won't believe this Mr.Feynperchild, the dispatcher might confide in a whisper, there were these perverse pornographers who were planning to make a disgusting movie of simulated coalescence of an aging neuter star with a degenerate dwarf! With this information in hand Mr. Feynman would have surely made a beeline to Pune.

Yes, times have changed. But the one remains. The gravitational legacy that has been handed down for ages. One can find ancient observations on


CHIRP CHIRP
FILTER
DATA
IT IS A BIRD, IT IS A PLANE, NO, IT IS A SUPERNOVA!
GRAVITY WAVE DETECTIVE
WHERE IS THE NEAREST BAR, BUDDY?
BAR DETECTOR
KILLING FIELDS
KNOT
TOPOLOGY
LOOP
STRING
BOTTOMOLOGY
SIMULATION STIMULATION ACTION!
DIRECTOR
AND WE SPECIALIZE IN CHAOS!
I CAN'T BEAR TO LOOK AT WHAT IS HAPPENING HERE!
LEMONADE
CH_3CH_2OH
BILLS
IOU
ABSTRACTS
CONCRETE
GR-NOW

the most modern ideas. Here is an example from the Revelations of St. John the Divine apparently referring to the cold and hot model of dark matter:

'I know thy works...'

Which means that he has read the previous papers of the author.

'I know thy works, that thou art neither cold nor hot: I would thou wert cold or hot. So then because thou art lukewarm, and neither cold nor hot, I will spue thee out of my mouth'.

Revelation (III, 15-16)

This is the most picturesque rejection by a referee I have ever come across.

In India, the gravitational tradition is as old as time itself. In fact our ancestors had gone way beyond gravitation and had mastered the art and science of levitation. But you do not see this ancient marvel in action. Long ago, I discussed this aspect with a practictioner of levitation, namely our family cook, who clarified why this is so. Let me explain in a language comprehensible to relativists. Levitation is an advanced process of quantum gravity. The levitator, by virtue of his spiritual power, creates a field of negative energy around him predominantly around his base where the all powerful yogic essence Kundilini resides. The consequent repulsion overcomes gravity leading to the phenomenon of levitation. However, any attempted act of observation forces, in Planckian time, the wave function of the levitator to collapse to the ground state. In other words, the levitator collapses to the ground.

The editors of the proceedings of the International Conferences on Gravitation and Cosmology (ICGC) held in Goa and Ahmedabad offered further glimpses of the Indian gravitational tradition. Under the heading 'Goa and Gravitation' they told us how a sage meditating underneath a coconut tree discovered, three centuries before Newton, the universal law of gravitation. As the discovery was occasioned by the fall of a coconut, and not an apple, it remained unknown with the discoverer perishing without publishing. Similarly, 'Ahmedabad and the Antenna' revealed that the famous Shaking Minarets of Ahmedabad actually constituted a gravitational dipole antenna which had detected gravitational radiation long ago.

Many were the reasons for selecting Goa as the venue for a conference on gravitation. For instance, the natural beauty of the land with its emerald sea, the azure sky and the vast stretches of golden sand. The warm hospitality and the open friendliness of the people. A fascinating culture in which the East and the West have mingled together. In addition to all these, there was a historical reason as well. Legend has it that a sage belonging to this region discovered the universal law of gravitation some three hundred years before Isaac newton. It so happens that there are hardly any apple trees in Goa, but one can find coconut groves all around. Consequently the discovery of the law of gravitation by our sage was occasioned by the fall of a coconut, as he sat in a contemplative mood. Needless to add, the world remained ignorant of his finding. This was indeed the first authentic case in unrecorded history of perishing without publishing.

From: *Highlights in Gravitation and Cosmology,*ed. B R Iyer, A Kembhavi, J V Narlikar and C V Vishveshwara, Cambridge University Press (1988).

AHMEDABAD AND THE ANTENNA

The famous Shaking Minarets of Ahmedabad built around the middle of the fifteenth century, consists of two lofty minars with a connecting bridge forming a resonating system. It is a little known fact that the Minarets were the first dipole antenna ever designed and constructed to detect gravitational radiation. Vibrations of the minars induced by gravity waves were picked up by a highly sensitive thin-skinned nobleman belonging to the court of ruling Ahmedshah dynasty and transmitted orally to an equally sensitive receiver. The antenna was most effectively shielded by soldiers who wielded not only shields but also swords. They eliminated all sources of noise, both white and coloured, without racial discrimination. Data were analysed using abaci placed perfectly parallel to one another, a procedure that heralded parallel computing. Although the dipole antennae like the Shaking Minarets firmly established the existence of gravity waves, they were abandoned in favour of quadrupole antennae with four minars such as the Charminar in Hyderabad and the Taj Mahal in Agra. The results of these observations were never made public on account of cuts in royal funding, court intrigues, harem politics and charging pages. Here was an authentic case in unrecorded history of a major discovery perishing because of not publishing.

From: *Advances in Gravitation and Cosmology*,ed B.R. Iyer, A.R. Prasanna, R.K. Verma and C.V. Vishveshwara, Wiley Eastern (1993).

How about Pune? Is there some link with the Indian gravitational tradition that has brought GR to this town? Yes, indeed. Let us call this nexus 'Pune and the Purana'. Puranas are mythological legends. We are told that Pune has been the traditional seat of learning where scholars have studied deep the Agni Purana or the Legend of Fire. In a way this has to do with the study of the Primordial Fire or the Big Bang itself. There are rumours that these scholars have been engaged of late in the study of quasi-Agni Purana involving mini-Agnies.

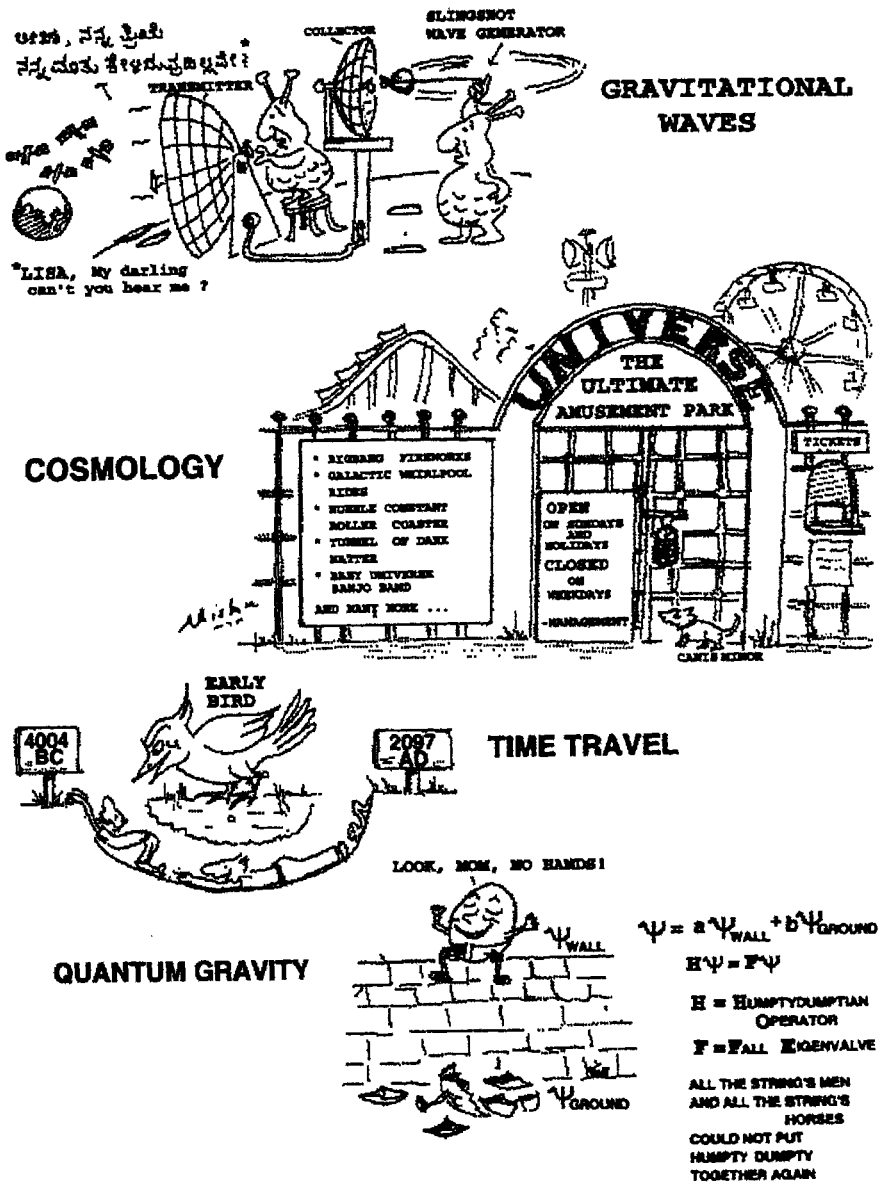
Well, we have seen the glorious past. And the happy present. The happiest aspect of the present is that the World Wildlife Fund has taken relativists off the list of endangered species.

What about the future? Never has it been rosier. All our dreams will come true. But, there may be some surprises in store for us.

We shall surely detect gravitational radiation. At the same time we shall in all probability discover the extraterrestrials too. Obviously, advanced alien civilizations have been sending their signals not by radio waves but through gravitational radiation. Let us not despair that the fifth force does not exist. Surely, the sixth, seventh and the eighth do. We shall find out whether the universe is open or closed. For all we know, like all good places of business, it may be open on week days and closed on Sundays and holidays. We may yet travel back in time by worm holes. However, we may have to watch out for early birds who may mistake us for worms. No doubt gravity will be quantized. But we need unconventional ideas and unusual techniques for this. Loop space may be good, but loophole space is better. Laws of nature, like man-made laws, have their own loopholes and we should take advantage of them. Then again we need novel techniques like the Arab Summation Ploy discovered by medieval Arab mathematicians for summing up a divergent series. The trick is to sum the series from right to left so that the terms decrease in magnitude progressively. It was natural for the Arabs to discover this, since they read from right to left any way. In the scheme of things there will be place even for relativists like me who work hard to find out answers to questions that nobody asks.

I come now to my concluding remarks. Please do not be alarmed. It is not at all like those papers in which the concluding remarks are no more than thinly veiled variation of the introduction.

When Ted Newman asked me to give this talk, I sought a clarification from him. I wanted to know whether I was the only speaker or I was to share this honour with someone else. Ted never wondered why I was asking such a strange question. Ted has lost his scientific curiosity. Heaven help him! Let me tell you the reason. I was taking no chances. For, I remembered the story of how a committee asked its chairman to invite a wit to give a talk. Since he could not find one, the chairman brought two halfwits instead.



THINGS TO COME

On the other hand, is it possible that Ted could not find two halfwits and therefore invited only one? I hope not.

Acknowledgements and Bibliography

I am deeply indebted to Prof. Jesús Moya, Bilbao, Spain who created the Food Theorem for me in Greek and Latin with interest and enthusiasm. I am grateful to Prof. Alberto Chamorro for introducing Prof. Moya to me. It is a pleasure to thank Prof. Konstantinos Kokkotas for some clarifications in regard to the Greek language.

Ambrose Bierce, *The Devil's Dictionary,*Dolphin Books.
Giorgio De Santillana, *The Crime of Galileo,* Phoenix Books (1959).
D. Gjertsen, *The Newton Handbook,* Routledge and Kegan Paul (1986).
D. McKie and G.K. De Beer, *Newton's Apple* in Notes and Records of the Royal Society of London, Vol. 9 (1952).
A.J. Friedman and C. C. Donley, *Einstein as Myth and Muse* , Cambridge University Press (1985).
L.D. Henderson, *The Fourth Dimension and Non-Euclidean Geometry in Modern Art,* Princeton University Press (1983).
Salvador Dali, *50 Secrets of Magic Craftsmanship,* Dover Publications (1992).
E.L. Schucking, *Views from a Distant Past* in *General Relativity and Gravitation* , ed. N. Ashby, D.F. Bartlett and W. Wyss, Cambridge University Press (1990).
R.P. Feynman, *Surely, You're Joking Mr. Feynman!,* Bantam Books (1989).

I would like to express my sincere appreciation to Mr. Rajesh Nayak, Mr. R. Nandakumar and Ms. G. K. Rajeshwari for their invaluable help in preparing the manuscript of this article.