Excerpt from the book Aberrations of Relativity (p. 246 to 255)

The Strange Timing and Revocability of the Decision of the Andromedans to Attack Earth

We are all acutely aware that strange things play out in the fullness of time, but possibly the strangest involves the remote revocability of that fateful decision of the Andromedans to attack Earth.

There being some 300 billion stars in the galaxy which we variously denominate M31, NGC 224 and Andromeda, the name itself becomes somewhat indicative of the awesome capabilities realized by this one nation, indivisible under God throughout that giant island universe. But this article will not venture tangentially off into the political science fiction never-never land of the historical aspects of the origin and past of this species that may or may not conquer (or even have set out to conquer) the Milky Way Galaxy. The *decision*, Ah yes! that so aggrandized nod of the head in board rooms on even this humble planet, is once again the topic of the day. Consequences, although probably never a 'Boom!' to our stock market like that caused by the decision to lay off 40,000 IBM workers as a boon to investors, does have some quite interesting aspects, however, but again, we will leave that to speculation. It is the *timing* of the decision, independent of its historical perspective or eschatological ramifications, the mere assessment of *when* did, or will, that decision occur. Just trying to make sense of that tiny bit of minutia, before it is lost in endless debate of liberal artists and mean-spirited conservatives to be gobbled up by more profound issues surrounding the situation, is the object of this discussion.

Sir Roger Penrose is a rather interesting little man who raises the odd question from time to time. To my mind on page 201 of *The Emperor's New Mind*, one of the better formulated of these appears, not as a question actually, but as a description:

"*Even with quite slow relative velocities, significant differences in time-ordering will occur for events at great distances. Imagine two people walking slowly past each other in the street. The events on the Andromeda galaxy (the closest large galaxy… [about two million light years] distant) judged by the two people to be simultaneous with the moment that they pass one another could amount to a difference of several days. For one of the people, the space fleet launched with the intent to wipe out life on the planet Earth is already on its way; while for the other, the very decision about whether or not to launch that fleet has not yet even been made!*"

But that is a small part of the story of the epic decision. (I have no idea why Sir Roger chose to tell us so little). The Andromedans, having been a highly competitive nation for eons, had as a sporting gesture placed a *stationary* space probe at a position relative to the Earth that would result in its passing nearby our planet at about X years prior to the decision having been made on Andromeda. The probe was designed to jettison a message for Earth which would detail the date that the decision would be made to allow Earth several thousand millennia to prepare (very nearly the amount of time the Andromedans had had to prepare after having positioned the probe and initiated its time synchronization, up until launch time of the fleet, if that were to be the decision). It would serve Earth well in any case.

So as Roger's two men pass, they both are reading the report of the jettisoned message in copies of the same newspaper. Both men are scientists of a sort and so the report interests them, and although one never passes up any opportunity to show off his superior understanding of relativity (and in fact concentrates rather heavily on the precise value of X), both understand it well enough to realize that the probe although 'stationary' relative to Andromeda and, therefore, moving at about 200 miles per second with respect to them implies that in spite of the good faith intentions of the Andromedans and the fact that the report indicates the decision will not be made for another X years, it is in fact immanent! How immanent of course depending quite sensitively on the direction and speed of one's strolling at the moment. This subtlety was not overlooked by Sir Roger nor one of the two men.

A small passage at the end of the report is interesting in that it indicates that the probe has evidently progressed considerably beyond the droids of human folk lore, it states that it would "bet on it!" A bit threatening to say the least! The men reach each other just as they each read this statement, the one saying to the other in passing, "I'll bet it happened!" The other quite resignedly says, glancing over at the former with the lesser knowledge of relativity, "I'm betting it won't!" The former stops still in his tracks, thinks for a moment, turns, and then steps out after the latter. In *his* universe, the space fleet may have inadvertently stopped and headed butt-first, back ass-wards back to Andromeda (that is, if the decision had been to proceed with the invasion in the first – or is it subsequent – place), but at any rate will now await the decision that had launched them several days earlier. It was a dastardly act for him as a mere mortal human being, hardly in keeping with the sporting spirit of the Andromedans, but at least it would give him time to reconsider his bet before the decision was *actually* made. Why had his friend been so sure? Certainly his fine knowledge of relativity would have assured him from the subtle timing of the message that Andromedans had known about relativity many millions of years ago. But what can one conclude from that? Nothing!

As he thought about it, he wondered. Now that the decision was to be made all over again, could the outcome of the decision process that was going on even as he contemplated it be any different than the one he had just revoked? Did a ruler of that great nation not even possess free will? Or does each and every decision have a preordained outcome being unveiled ceremoniously as a surprise at its appointed time in every Lorentz frame?

Stopping in perplexity, once again the Andromedan fleet took off heading toward the Milky Way, maybe even directly to planet Earth. Or did they? Maybe his momentary remote consideration had been cause enough for them to reconsider the pusillanimity of a preemptive strike – even against so disgusting a species as Homo sapiens.

Definitions and Illustrations Pertinent to the Andromedan Attack Problem

Special relativity involves concepts including *absolute* and *relative* past and future as against the everyday terms 'past' and 'future'. It also incorporates 'elsewhere' and 'else-when'. To portray these concepts the *space-time diagram* of figure 1 has been drawn for an observer suggesting areas and directions in four-space to which these terms consistently apply. A third dimension is omitted per tradition in this diagram to accommodate visualization of the fourth

(time); conical surfaces (*light cones*) correspond to events connected to the observer via detection or emission of light. *Elsewhere* and *else-when* refer, of course, to that region of four-space which is currently isolated from – and inaccessible to – the observer, i. e., those regions outside his light cone. Nothing he does *now* can affect nor be affected by these events. This domain comprises, by any reasonable accounting, more than half (½) of everything that *is*.

Einstein's clock synchronization procedures determine clock settings at remote locations from the observer. Einstein elaborated the method of synchronization using the round trip transmission of light that assumes an identical speed for both segments of the path. This procedure produces the common sense result for relatively stationary clocks and retains compatibility with the Lorentz transformation when there is relative motion. The implications of the assumed isotropy of the speed of light are far-reaching. The concept of simultaneity is intimately tied to this assumption. The very concept of mutual simultaneity of two events at remote locations for two coincident observers has had to be sacrificed in the interest of consistency of Einstein's interpretation such that the timing of the decision on Andromeda would seem to have been left in the lurch as shown in figure 2.

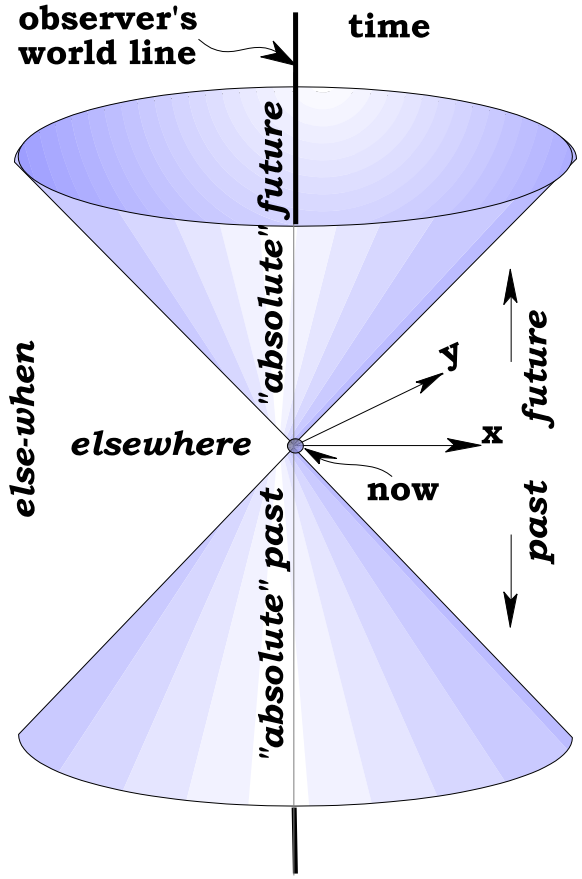

Figure 1: Spacetime diagram for defining denominated regions of four-space

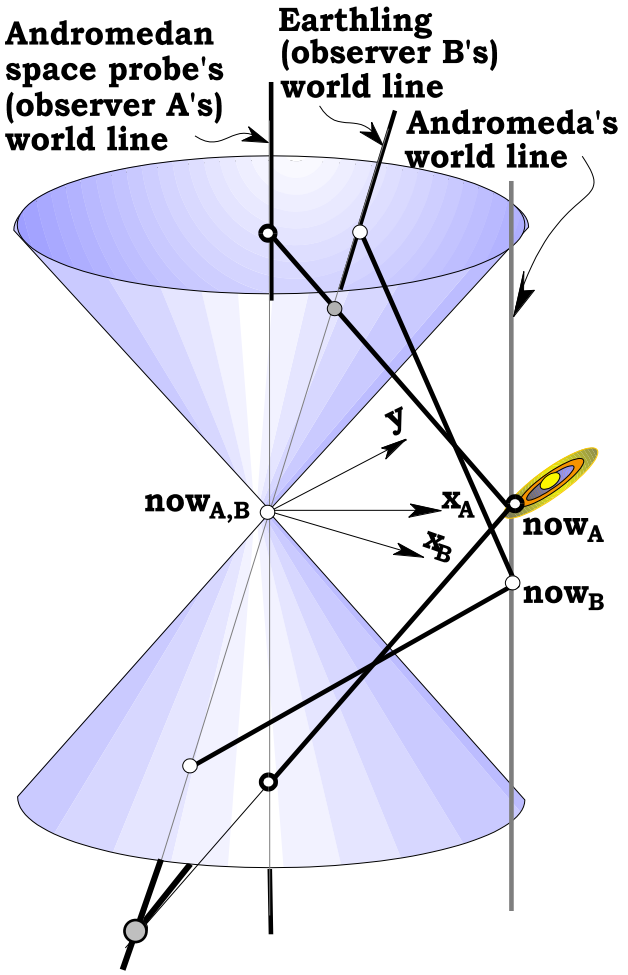

Figure 2: 'Now' in separate frames of reference

In Defense of the Andromedan Dilemma[*]

When I indulge fantasies by writing an article on a topic for which I am a layman, there is certain exhilaration in having someone well-respected in the field comment on that article. Nonetheless, it is a major disappointment when the response addresses preconceived notions of a misconception rather than the article itself. I feel such mixed emotions now because R__ has not responded to the central question that was raised. It involved a situation in which one of two individuals strolling down *Jesus Lane* – a quaint little street on the campus at Cambridge, England where Sir Roger Penrose frequently holds court – turns around to follow the other. Does the status of the Andromedan decision of whether to attack earth ***actually*** change from 'already decided' to merely 'imminent,' in the ego-centric frame of the individual who so turns?

It is as if having come for the funeral of a close friend with great expectations I am listening intently to a eulogy that has been hijacked for the paltry purpose of saving the souls of mourners instead of recounting the gallant deeds of the deceased. So why am I here? Does my soul need saving or am I just here to help carry the casket?

Disenthralling myself from such diversionary thoughts, let me respond to the problem R__ has phrased (without going so far as to deny that Andromeda *is* actually approaching earth at approximately 200 miles per second rather than receding at a beetle's[&] pace) so that a meaningful debate of concepts can proceed.

Pragmatism is often confused with relativity by laymen, less frequently by those who are intimate with either concept. When R__ states that, "it all depends what you mean by" the decision having already been made in one observer's frame of reference while it is still days from having been decided in the other, is he suggesting that there may be no more meaning to *factual* statements such as, "The Andromedan armada left their home base on February 23 of the year AD 1997," than one wishes to assign to them? No. I'm quite sure he is not. There is a specific and unique time at which any event transpires in any frame of reference; one cannot just will it to be one way or another. Of course coordination and synchronization of the various clocks that would disambiguate such statements between frames of reference are quite problematical as he points out.

But are conjectures concerning events within the region of *elsewhere* and *else-when* merely the subject matter of rhetoric and science fiction? Not at all. At every moment in time events occurring throughout the entire spatial universe are *elsewhere* with respect to that point on the 'world line' of the observer; the existence of events in the domain of *elsewhere* and *else-when* is certainly not doubtful nor of little consequence. Events which occur there do have an objective time and location of occurrence and, furthermore, the mere fact that an event is *elsewhere* for a given observer at a particular time does not imply that it has always been elsewhere nor that it necessarily will remain so. Epistemologically as tiny children we came to accept that objects existed even when they were outside of our immediate field of view. The same reasoning can assure us of events that occur *elsewhere* and *else-when*. A remote event from *elsewhere* may yet affect us in the future (as for example, an Andromedan attack) and, in fact, might very well have been affected by one or more of our past actions.

---

[*] The article was written in response to critical comments on the previous article by a friend who is a professor of mathematics and physics in England.

[&] "Beetle" is, of course, slang for "professor" on the Oxford campus where that friend received his PhD in physics. (I try to keep my allusions pertinent.)

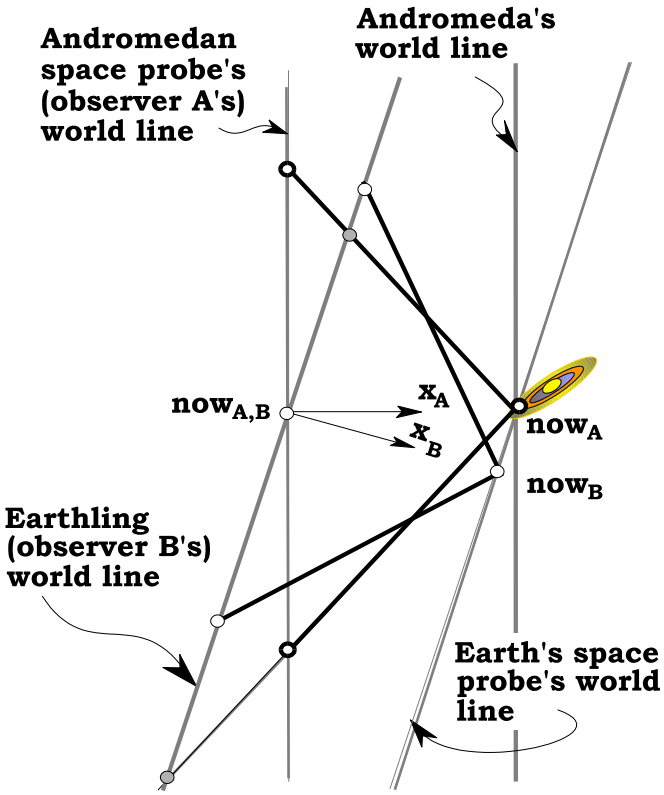

Figure 3: The situation if there were an earth space probe at Andromeda

Einstein elaborated a method of synchronization of clocks using a round trip light path that assumes an identical speed for both segments of the round trip that reverts to common sense for relatively stationary clocks and is compatible with the Lorentz transformation in any case. But how has this changed the conception of time such that inferred differences in how long ago events occurred may in some obscure sense be considered merely pragmatic?

I found R__'s "important note" concerning the possible use of projectiles other than light to be distracting but most interesting as red herrings go. In the first place, if we're talking truly elastic balls bouncing from a truly elastic surface, the balls will not exhibit the requisite *same* speed for the 'thrower' on both segments of a round trip if the elastic surface is in relative motion with respect to the original thrower of the balls. Catapults would require a unique mechanization in each frame if the *same* speed were to be realized on both legs of a round trip path, etc.. Photons are the only 'elastic objects' (stretching our imaginations a little) that could even conceivably change the magnitude of their momentum upon reflection without also changing speed. They (as legitimate heirs of Einstein's "rays of light") occupy pre-eminent positions in the special theory of relativity. In the second place, if another object type could be substituted that had a speed less than that of light, then if its speed bore the same relationship to the Lorentz transformation equations that light speed does – which I take his note to imply, the equations would be invalid for coordination of observers with greater relative speed even if less than that of light.

So how has special relativity changed the conception of time so as to suggest to R__ that measurable time interval differences might *be* whatever we mean by them? The very notion reminds me of a beatnik who, upon encountering an injured man lying by the road crying, "Call me an ambulance!" calmly says, "Ok man, you're an ambulance!" Perhaps it's the same chap whose funeral became such a travesty. But back to the main issue.

The problem here is not mere definitions and what we subjectively mean by this or that. Suppose that earthlings had been so sophisticated eons ago, might we then have had our own probe that would pass by Andromeda just as the decision was being made and the Andromedan probe passed by earth? "No," according to the special theory, two such remote events (i. e., the Andromedan probe passing earth and the decision being reached on Andromeda) cannot be set up to be simultaneous in both frames. At the instant of passing noted on earth as well as by the synchronized clock on the terrestrial probe destined to pass by Andromeda, the decision would not occur for two millennia as shown in figure 3 on the preceding page.

Strange? Ain't relativity wonderful!

Consistent? I don't think so. But maybe it comes down to "what you mean by" *consistent*!

Wrong? Very probably.