A new cosmology: solution to the starlight travel time problem

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Solutions proposed for the starlight-travel-time problem in creationist cosmology fall within one of five categories. Probably only two of the categories hold any hope of a solution. Any solution must be self consistent and the type of solution adopted affects which astronomical arguments can be used as valid evidence for a young universe. A new cosmological model, of the same class as Humphreys' White-hole Cosmology, is presented, which fits the observational evidence from the cosmos.

As has been often repeated in creationist literature, the starlight-travel-time problem is particularly important to solve. The problem is simply that in the time available since creation (about 6,000 years) there has not been enough time for light to get to Earth from even the nearest neighbour galaxies (1.5 to 3 million years travel time at constant speed of light c) let alone the most distant galaxies (billions of years travel time at constant c). How then do we see them and how did Adam see them?

One common solution that has been presented, and continues to appear, is that the speed of light was enormously faster around Creation Week and has slowed down since (c-decay[1]). A good example of this may be found in a book by Burgess,[2] which has recently been reviewed. The review describes a rapid aging process for stars and a faster speed of light. The universe was accelerated like fast-forwarding a video tape, and after all the light information reached the Earth the rates were reduced to what we now measure. The problem with this model is that the stars would disappear from view as the light slowed down, subsequently taking millions and billions of years to get to Earth. Also, such light arriving at the Earth would show enormous observable blueshifts.[3] It doesn't. A more ingenious mechanism is needed to overcome such obvious objections.

In a recent letter to the Editor,[4] R.E. Kofahl describes an appealing scenario of the heavens being stretched out and the speed of light being up to 600 billion times the present value. Again this presents the same problem: once the speed of light slowed down, how do we now see the stars? The stars provide us with information in the starlight that we see.

If the speed of light had been enormously faster in the past we should be able to detect that in the starlight. Unless a plausible mechanism can be demonstrated, that doesn't lead to absurd physical implications, these types of scenarios will always fail.

As an argument against the validity of long ages in the universe and for recent creation, it is not uncommon for creationist authors to point out some astrophysical feature (e.g. the high dispersion velocities of stars in galaxies)[5] that is inconsistent with the assumed long ages in big bang cosmology. The authors then use this as evidence for short ages (i.e. 6,000 years) in the cosmos, consistent with a creationist view. But surely that type of argument is only valid in the framework of the creationist model adopted. You can't have a Humphreys' type model,[6] with time running faster in the cosmos than on Earth and as a result billions of years pass, *and* use the short age argument together. Within the framework of the adopted model, for example, there may still be insufficient time for the observed spirals to wind up. In the big bang conjecture all galaxies in the universe formed at the same epoch only a billion years after the big bang, which is alleged to have occurred 12–18 billion years ago. So the question may still be asked, 'why are there still spirals?' Why haven't they all wound up?[7] This would still be a cogent creationist argument. Self-consistency is essential or we have no argument.

The whole underlying problem may be a reluctance by creationist cosmologists to break with the idea that time is absolute and that it has always flowed at a constant rate all throughout the universe. Humphreys' white-hole model[6] made such a break and has generally been well received by creationists. Probably this is because his model involves accelerated time increments happening in the cosmos *during* 24-hour periods on Earth. It needs to be made very clear that in the cosmos billions of years of ordinary Earth time may have passed, while only 6×24-hour days passed on Earth. But a valid mechanism describing how this happened has yet to be discovered.

The Humphreys' model uses an 'economy' of miracles and as a result relies heavily on a particular solution of Einstein's field equations from general relativity to explain the mechanics of the cosmos. In terms of apologetic value, this approach is very appealing but observationally there are difficulties.[8] Also, it is important to remember that God was not bound to any laws of physics until the end of the Creation Week. After it ended, the Word says 'He rested'. Maybe the solution to the starlight travel time problem is in this fact that the conservation laws we observe today were not yet all operating.

Wherein lies the solution?

There are five possible areas of explanation, in my opinion, all consistent with the text of Genesis, that still maintain the 6×24-hour literal days. They are,

1.   That the language of Genesis is phenomenological language (describing appearance). In this case, stars were made millions and billions of years before Day 4, but in such a manner that the light from all stars, no matter how far away, all arrived at the Earth on Day 4 and so would have been seen first at that moment. This is then a reference frame time-stamping events from that moment they are seen on Earth. Newton's time convention[9] describes this idea. The long-term survival of this model, in my opinion, lies with scriptural interpretation, for example, whether the phenomenological view is consistent with Ex. 20:9, 11, which reads, 'Six days you shall labour, and do *all* your work: For in six days the LORD made heaven and earth, the sea, and all that in them is, and rested the seventh day … '. The emphasized word 'all' seems to restrict the work being done before to the Creation Week period where 6 days pass on Earth. The phenomenological interpretation puts the actual physical creation of the stars before the six days begin and is 'seen' as happening on Day 4 on Earth. Note that Newton's physical interpretation is questionable and I have elaborated on this in published correspondence.[10]

2.   That clocks in the cosmos in the past have run at much higher rates than clocks on Earth. Especially during Creation Week, clocks of the exact same type on the edge of the universe ran something like 10^{13} times faster than clocks on Earth and therefore light from such regions had plenty of time to get to Earth in a matter of days, not millions or billions of years. The Burgess model[2] is of this type.[11] This hypothesis is not as simple as it first seems and the light coming from the cosmos carries information that makes the model testable. We can compare clock rates on Earth today with clock rates in sources on galaxies in the cosmos and we should still see a difference. However, I contend that there are no observations that support this hypothesis. In fact, observational evidence suggests the contrary. Light from those sources that have faster clock rates should be blueshifted[3] compared to Earth clocks. It is not.

3.   That clocks on Earth in the past have run at much slower rates than clocks in the cosmos. Especially during Creation Week clocks of the exact same type on Earth ran about 10^{13} times slower than clocks at the edge of the universe and therefore light from the edge of the universe had plenty of time to get to Earth in a matter of days as recorded by Earth clocks, not millions or billions of years. Humphreys' model[6] is of this type. The perception of time to someone on the Earth looking at astronomical clocks, during this period, would be that they are running very fast. The hypothesis is simpler than 2) and not equivalent.[12] It is important to realise that this description requires that the universe have a preferred frame of reference. There is evidence that this is the case and it appears the Earth is actually near the centre of the universe.[13] The language of Genesis puts the Earth in a reference frame that is special, in the centre of God's will and plan. A new model of this type is suggested below.

4.   That the speed of light was enormously faster in the past, of the order $10^{11}c$ to $10^{12}c$. This may have been the case during Creation Week and then the light slowed enormously to the present value. Again this model is testable, especially with astronomical observations, such as measurements of the fine structure constant. This hypothesis has been advanced in the past by creationists, Setterfield and Norman,[1] who placed considerable weight on the precision of a few historical astronomical determinations of the speed of light. The idea is currently in vogue in the secular community,[14] but they are not dealing with timescales on Earth of only 6,000 years. The observational evidence available to us today clearly precludes this model.[15] It is absolutely not viable, unless there is and has been a complicated balance of changes in many 'so-called' constants over observable history. But Occam's razor[16] would tell us that this is not the case. Another model in this category is the Harris model.[17] It starts with an infinite speed of light at creation. Then, after the Fall, it changes to the current value as a function of time and linear distance from Earth. Like an expanding bubble spreading out through the universe, the speed of light drops from an infinite value to the current value at the surface of the bubble. One problem with this model may be the massive blueshifts resulting from a change of infinite to finite speed of light. Also the fine structure of the atomic spectra must change from a stage of no fine structure to the current state as the bubble passes. This would be observable in starlight. It isn't.

5.   Mystery and miracles! This last option I have to include because the Creator God revealed in the Bible *is* a God of miracles. It is probably true that if we were looking a miracle in the face we might try to reason a naturalistic mechanism for it. God does intervene in the physical world and during those times the laws of physics are obviously 'put on hold' (or rather, added to). However, I don't believe God commits fraud. Creating a beam of light from source to observer so that the observer appears to see current information must also mean there is a whole stream of information in the beam that is false. But the question may be asked whether God created the light from the stars just outside the solar system that carries current and accurate information from those stars? Yes, He could have, but when it is a miracle it is usually understood and/or revealed. For example, when supernova 1987A exploded in the Large Magellanic Cloud, did it explode 200,000 years ago or in 1987? God could have miraculously translated the light across 200,000 light-years distance of space instantly (as if the photons passed through a wormhole) and then just outside the solar system let it move at the speed *c*. This hypothesis is un-testable and seems implausible.

Humphreys' White-hole Cosmology

Humphreys' White-hole Cosmology (HWC)[6,18,19] model is an excellent attempt to address this important question in creationist cosmology. However it seems to

suffer from a few deficiencies.[8,20] In this model, all the matter of the universe expanded out through a 'white hole' during Creation Week to form the cosmos. At the same time space expanded with the matter, moving by virtue of that expansion. Due to gravitational time dilation, clocks on Earth near the centre of this spherically-symmetric, bounded and finite distribution of matter ran slower than clocks throughout the cosmos. The farther out one looks the faster clocks would appear to run compared to Earth clocks. But because Earth clocks are, at least initially, deep in a gravitational well, they are running slow and the clocks in the cosmos are less affected by gravity and run fast. Let's say for clocks free from gravity that they run at a *normal* rate, the same as most clocks run today on or near the Earth. (Let's not concern ourselves with small corrections due to relative motion or gravitational potential near Earth).

If this picture was still the state of the universe that we see today, then starlight would be blueshifted (a gravitational effect) and that blueshift would be greater at greater distances from the Earth. This is not what is observed. We, in fact, see redshifts that are small in magnitude compared to the required magnitudes for the needed blueshifts.[8] The HWC model however also involves a 'timeless' Euclidean zone where the time coordinate in the general relativity spacetime metric becomes spacelike during the expansion stage. This timeless region collapses as material expands out through the 'white hole' and eventually it disappears as it reaches Earth. As addressed in another paper,[8] this too has its problems both in its mathematical description and conceptually, as there is insufficient time-dilation locally (between nearby galaxies at least). As a result there remains a difficulty in explaining how light from nearby galaxies would get to Earth in 6,000 years or less.

A new model

I propose a new model of type 3. During Creation Week, all clocks on Earth, at least up to Day 4, ran at about 10^{-13} times the rate of *astronomical* clocks. Actually the rate is a parameter of the model. All *astronomical* clocks in the cosmos run at the same rate that we would measure any *normal* clock today. They have always done so except under special circumstances where they might have been affected by gravity. During this time the rotation speed of the newly created Earth was about 10^{-13} times the current rotation speed as measured by astronomical clocks, but normal by Earth clocks. By the close of Day 4 the clock rates on Earth rapidly speeded up to the same rate as the *astronomical* clocks. All of this was maintained under God's creative power before He allowed the laws of physics to operate 'on their own' at the end of Creation Week.

An 'observer' on Earth at this time looking at the heavens would have seen apparently accelerated motions. Conversely, an 'observer' outside our solar system would observe apparently very slow advance of time on Earth

clocks. In fact, only in an extra-solar system frame of reference would Earth clocks appear to be running slow. This effect would allow millions and billions of years to pass in the cosmos, while only a few 24-hour days pass on Earth. Hence the light from the most distant stars travelling at the normal speed, *c*, would have plenty of time to get to Earth. Of course, I am not suggesting there were any such observers, except the Creator, but He doesn't live within time.

The question might be raised as to the spatial region of this special frame around the Earth where clocks run slower up to or during Day 4 of creation. To be consistent with Scripture it doesn't necessarily need to include the whole solar system. However, it may have, because light from anywhere in the solar system can reach Earth within about 8 hours. If the special frame was confined to the solar system, we could call it 'young'.[21] If the special frame was confined to the Earth only, we could call the solar system 'old'.[22] The difference would make the model testable. However, to be self-consistent with other evidence that makes the solar system appear 'young',[23] I would place the boundary of the special frame at least outside the solar system. So then this is consistent with my Young Solar System (YSS) model.[8] Further investigation is required though to see if this is consistent with other age estimators within our region of space.

Of course the stars were made on Day 4. In order for Adam to see light from the nearest stars (other than the sun), on Day 6, it is necessary that the edge of the special Earth frame not extend much beyond Pluto. Therefore due to the massive time dilation effect, during Creation Week, Adam would have been able to see starlight on Earth coming from the visible stars of at least our own galaxy. The light coming from supernova 1987A travelled most of its journey through a portion of Day 4 of Creation Week, when the Earth clock rates were very slow. It arrived at the Earth in 1987, some 200,000 *astronomical years*[24] after it departed.

This model is simple in design and makes no unusual predictions about past events. It is similar to Humphreys' model with some important differences. Time after the end of Day 4 is linear in the whole universe and may be understood in the normal commonsense way. Time during Creation Week up to Day 4 is highly non-linear but only on Earth (and possibly the surrounding solar system), and nowhere else throughout the cosmos. (Note: the HWC model employs different rates of clocks and different passage of time in the cosmos in a highly non-linear fashion, which should be detectable from Earth today.) In my model, the general matter distribution of the stars and galaxies in the universe is the universal frame of all reference clocks. Generally these *astronomical* clocks have ticked at the same rate. Clocks on Earth since Day 4 also have ticked at the same rate as these universal clocks. Only clocks on Earth up to the close of Day 4 ticked much slower compared to the universal reference clocks. The model does not employ any general relativistic effects as does HWC but it doesn't impose any implausible

conditions either. *The Creation Week period, by definition, is not expected to be a period where natural law explanations apply.*

There are a few points about this model that should be stated here:

(1) it has low apologetic value, because in terms of extra-solar system observations it makes no unusual predictions.

(2) in terms of locally elapsed time since creation, this model does imply that objects within the solar system are much younger than objects outside it. Therefore, even though further investigation needs to be undertaken, there is some evidence for a young sun[25] but it may also be argued that God created the sun mature[26] as it was especially important for life on Earth.

(3) There is the question of where and what type of boundary should be postulated that once enclosed the 'slow' zone. Was it a sharp or gradual transition to 'astronomical' clock rates, and what observational consequences might be expected?

Calculations

Let's do a few simple calculations. Let us suppose that the relative rate of clocks on Earth compared to *astronomical* clocks during Creation Week was

$$\frac{\partial t_0}{\partial t} = 10^{-13}, \qquad (1)$$

where t_0 represents time on Earth and t represents time in the cosmos (same for all clocks everywhere except on Earth). By integrating over the 24 hours of Day 4 (assuming = 0.003 years approximately), we can calculate the time available in the cosmos for a photon to travel to Earth. It follows from (1),

$$\int_0^t dt = \int_0^{0.003} \left(\frac{\partial t}{\partial t_0}\right) dt_0 = 10^{13}(0.003) = 30 \text{ billion years} \quad (2)$$

There is more than sufficient time during Creation Week. And since light now arriving on Earth left the stars some time during Creation Week, it had plenty of *astronomical years* to nearly get to Earth. The rest of the journey has been made in the 6,000 years since creation. No accelerated speeds have been assumed, just the constant speed of light that has been repeatedly measured for the past 300 years. It is not necessary to suppose that light from all stars in the universe arrived by the close of Creation Week, but at a minimum from our own Milky Way galaxy and maybe farther out to the Virgo Cluster of the order of 70 million light years. The specific dilation rate in (1) is an adjustable

parameter of the model, which would determine the extent to how far starlight travelled during Day 4.

Expansion of the cosmos

The issue of whether or not the universe rapidly expanded during the Creation Week is not crucial to this model; however it seems the scriptures demand it. Verses like Job 9:8, 37:18; Psalm 104:2; Isaiah 40:22, 42:5, 44: 24 etc. may have their fulfilment in an expansion scenario. Since the model provides plenty of *astronomical time* during Days 1 to 4 on Earth, God could have stretched the heavens out to the billion light-years scales in this period of time, while forming the stars and galaxies on Day 4. And light travelling at constant *c* still would have gotten to Earth in little time as measured by Earth clocks. A mature creation that is seen as an expanding universe[27] may also be part of the description.

Conclusion

The amount and passage of time in the cosmos is pertinent to the creationist because we need to interpret the evidence within a self-consistent framework of the model we adopt. Therefore in a model of type 1) or type 3), which incorporate *astronomical* time, explanations of the rotation curves in galaxies,[28] the Tully-Fisher law[29] or the apparent excess of mass inferred from the dynamics of equilibrium clusters of galaxies become an issue to creationist cosmology.

A new model, of a type similar to Humphreys', has been described that allows billions of years to pass in the cosmos but only 24 hours on Earth during Day 4. In this model, the laws of physics are suspended while creation is in progress and enormous time dilation occurs between Earth clocks and *astronomical* clocks. This solves the light-travel-time

problem faced by creationist cosmology and makes all astronomical evidence fit the Genesis account. No non-physical requirements are placed on the model.

References

1. Norman, T. and Setterfield, B., The atomic constants, light and time, *SRI International Invited Research Report,* Menlo Park, 1986.

2. Burgess, S., *He Made the Stars Also*, Day One Publications, Surrey, 2001. Recently reviewed in *CRSQ* **39:**39, 2002.

3. If the speed of light was much greater in the past, either the frequencies were higher due to higher excitation energies of the sources or the received wavelengths are shortened by the Doppler effect. In either case, referenced against standard sources on Earth, such light would appear blueshifted.

4. Kofahl, R.E., Letter to the Editor: Speculation concerning God's "big bang", *CRSQ* **39**:64, 2002.

5. Bernitt, R., Fast stars challenge big bang origin for dwarf galaxies, *TJ* **14**(3):5–7, 2000.

6. Humphreys, D. R., *Starlight and Time,* Master Books, Colorado Springs, 1994.

7. Astronomers no longer believe ellipticals wound up from earlier spiral forms because most have little angular motion. They are more like motionless blobs. However, in the time available to a spiral galaxy since the big bang it could have wound around about 500 times.

8. Hartnett, J. G., Look-back time in our galactic neighbourhood leads to a new cosmogony, *TJ* **17**(1):73–79, 2003.

9. Newton, R., Distant starlight and Genesis: conventions of time measurement, *TJ* **15**(1):80–85, 2001.

10. Hartnett, J.G., Distant starlight and Genesis: is 'observed time' a physical reality? *Letters, TJ* **16**(3):65–68, 2002.

11. It may be more accurately classified as a hybrid between my categories 2 and 4. But it does have a strong element of this type 2.

12. Consider the clock rates at emission and reception. In category 2 at emission, clocks in the distant cosmos were running faster than Earth clocks now run at reception. In category 3 at emission, clocks in the distant cosmos were running at the same rate as Earth clocks now run at reception. Only during a few days of Creation Week were Earth clocks running slower on receiving the light.

13. Humphreys, D.R., Our galaxy is the centre of the universe, 'quantized' red shifts show, *TJ* **16**(2):95–104, 2002.

14. Cho, A., Light may have slowed down, *Newscientist.com,* <www.newscientist.com/news/print.jsp?id=ns99991158>, 2001.

15. Hartnett, J.G., Is there any evidence for a change in c? Implications for creationist cosmology, *TJ* **16**(3):89–94, 2002.

16. Occam, William of Occam (or Ockham) (1284–1347) was an English philosopher and theologian. His work on knowledge, logic and scientific inquiry played a major role in the transition from medieval to modern thought. He based scientific knowledge on experience and self-evident truths, and on logical propositions resulting from those two sources. In his writings, Occam stressed the Aristotelian principle that entities must not be multiplied beyond what is necessary. This principle became known as Occam's (or Ockham's) Razor or the law of parsimony. A problem should be stated in its basic and simplest terms. In science, the simplest theory that fits the facts of a problem is the one that should be selected., <www.2think.org/occams_razor.shtml>.

17. Harris, D.M., A solution to seeing stars, *CRSQ* **15**(2):112–115, 1978.

18. Humphreys, D.R., New vistas of space and time, *TJ* **12**(2):195–212, 1998.

19. Humphreys, D.R., More on vistas, *TJ* **13**(1):55, 1999.

20. Worraker, W.J., Look-back time in Humphreys' cosmology, *TJ* **15**(2): 46–47, 2001.

21. 'Young' means that the age by Earth clocks is < 6,000 years.

22. 'Old' means the age by Earth clocks is of the order of millions or billions of years.

23. E.g. the abundance of short-period comets.

24. Astronomical years measure time applicable to astronomical objects. The ordinary years we measure on Earth now are also identical and have been since the end of Day 4 of Creation Week.

25. Davies, K., Evidence for a young Sun, *ICR Impact* **26**:1–4, 1996. Note that even though the question of the neutrino emission has been answered (see Newton, R., 'Missing' neutrinos found! No longer an age indicator, *TJ* **16**(3):123–125, 2002) the questions Davies discusses relating to the oscillation periods are still outstanding.

26. Faulkner, D., The young faint sun paradox and the age of the solar system, *ICR Impact* **300**:1–3, 1998.

27. A non-static universe seems to be an inevitable conclusion considering gravity to be only an attractive force.

28. Worraker, B. J., MOND over dark matter? *TJ* **16**(3):11–14, 2002.

29. Tully-Fisher law: observed luminosity of spiral galaxies varies as the fourth power of their rotational velocities.

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