Look-back time in Humphreys' cosmology

Any possible cosmological model purporting to provide a solution to the long-standing creationist problem of distant starlight in a young universe must:

1. agree with Scripture,
2. utilize sound scientific principles,
3. be internally consistent, and
4. agree with observation.

Dr Russell Humphreys has proposed a novel approach to the problem by postulating an expanded, spatially bounded universe with the Earth near the center, all within a general relativistic framework.[1,2] The basic idea is that the gravitational potential difference between the Earth and distant parts of the universe effectively slows the passage of time on Earth to such an extent that billions of years of cosmic time correspond to no more than a day of Earth time, specifically the fourth day of Creation Week.

As far as I can tell, Humphreys' cosmological models are consistent with the relevant Biblical data. He also appears to have successfully answered criticisms under criteria (2) and (3) above.[2–15] The question raised here, which, surprisingly, I have not seen in print before, is whether his published models can successfully meet criterion (4). In particular, do these models reproduce the observed visibility of astronomical objects at distances between thousands and billions of light years?

The predictions of Humphreys' models are, in principle, to be found in the age/distance curves plotted in Figure 11 of Ref. 1, (Appendix C), and in Figure 10 of Ref. 2. In Ref. 2 Humphreys states: 'In astronomers' terms, my cosmology has a look-back time to reckon with, just as the conventional cosmologies do (p. 208)'. In order to see the implications of including look-back time I have set up a computer spreadsheet (see Table 1) based on equation 24 of Ref. 2. This equation is reproduced below for convenience.

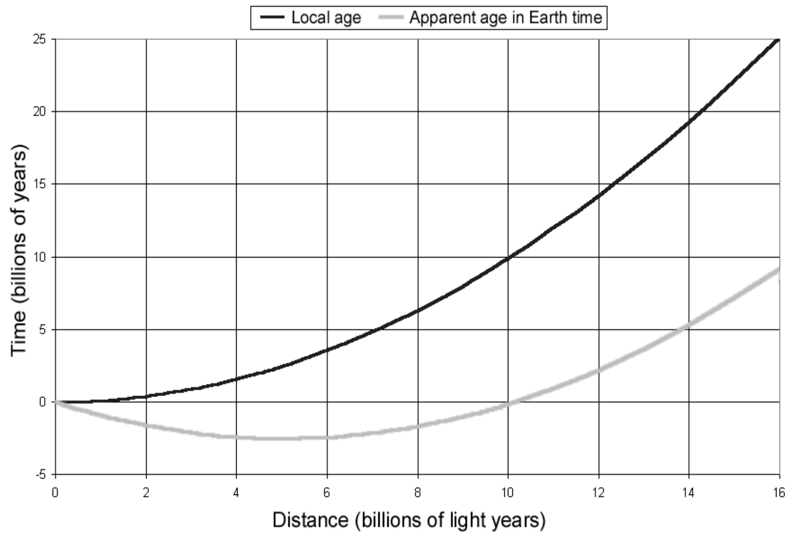

Figure 1. *Look-back time in Humphreys' cosmology.*

The independent variable χ in this equation is the 'comoving angle', a normalized measure of the distance of an object from the center of the expanding universe, and $T(\chi)$ is the local age or 'proper time' (i.e. as measured by real clocks) after the fourth day of Creation. τ_m is the half-period of the expansion and χ_e is the value of χ at the edge of matter.

For χ_e I have used the value of 45 degrees given in the caption to Figure 9 of Ref. 2, and for τ_m the value required to make the curve in Figure 10 pass through an age of 8 billion years at a distance of 9 billion light years. For a range of distances I have then calculated the predicted apparent age by (a) adding 6,000 years to the 'proper time' to allow for time elapsed since Creation Week, and (b) subtracting the light-time equivalent of the distance, i.e. the look-back time. Note my implied assumptions that the expansion of the universe stopped within Creation Week and that the speed of light is constant in space and time.

The result (see Table 1 and Figure 1) is that for all distances from just over 6,000 light years to about 10 billion light years, the apparent age is negative, implying that astronomical objects at distances in this range should not be visible. Thus we should not be able to see a large part of the Milky Way Galaxy (including its center), globular clusters, the Magellanic Clouds, the Andromeda Galaxy M31, the Virgo Galaxy cluster and much beyond! The parameters of equation 24 can be modified to some extent, but the result is qualitatively always the same because the curve in Figure 10 approximates to a parabola near the origin, as can be verified by analysis of equation 24 as $z \rightarrow z_e$. Figure 11 of Ref. 1 implies a similar result.

I put the above points to Humphreys in a letter[16] in May 1999. In his reply,[17] he did not question my analysis, but noted that the shapes of the curves in Figures 8–11 (of Ref. 2) depend on '… the rate of expansion, and on whether k [the parameter defining the curvature of space] is negative or positive'. He further noted that 'We would want the curves to be more like a straight line with a slope of 1/c, at least in the vicinity of the earth'.

$$T(\chi) = \frac{\tau_m}{\pi}\left[arccos(1-2z) - arccos(1-2z_e) + 2\sqrt{z-z^2} - 2\sqrt{z_e - z_e^2}\right]$$

where $z \equiv \frac{cos\,\chi_e}{cos\,\chi}$ and $z_e \equiv \cos\chi_e$; z is subject to the constraint $0 < z_e \le z \le 1$.

Equation for 'proper time' (Equation 24 of Ref 2, p.207).

Thus while recognizing that Humphreys only intended his age-distance curves to illustrate a general principle, *viz*. the visibility of extremely distant objects in a young-Earth cosmology, the conclusion seems inescapable that his published results to date do not meet criterion 4 above. In the absence of anything in print satisfying Humphreys' own requirement for age-distance curves to 'be more like a straight line with a slope of 1/c' near the Earth, we cannot yet claim to have a possible solution to the distant starlight problem. I point this out, not to discredit Humphreys' cosmological approach, but partly to correct the impression given by recent creationist advertising[18] that the distant starlight problem has been solved, and partly to encourage suitably-qualified creationist researchers to invest serious effort in finding more realistic models and thus help to realize the undoubtedly great potential of Humphreys' approach.

X	cos(X)	Z	TR	TR/X^2	DIST (bly)	AGE (by)	LBAGE (by)	Feature
0.000E+00	1.000000	0.707106781	0.00E+00	0.14486	0.0	0.00E+00	6.00E-06	
3.750E-07	1.000000	0.707106781	2.04E-14	0.14475		2.22E-11	-9.00E-06	M13
5.500E-05	1.000000	0.707106782	4.38E-10	0.14486	0.00220	4.78E-07	-2.19E-03	M31
2.275E-04	1.000000	0.707106799	7.50E-09	0.14486	0.0091	8.19E-06	-9.09E-03	M81
1.750E-03	0.999998	0.707107864	4.44E-07	0.14486	0.070	4.84E-04	-6.95E-02	Virgo Cluster
5.000E-02	0.998750	0.707991586	3.62E-04	0.14486	2.0	0.395	-1.605	
1.500E-01	0.988771	0.715136999	3.26E-03	0.14481	6.0	3.558	-2.442	
2.250E-01	0.974794	0.725390907	7.33E-03	0.14472	9.0	8.000	-1.000	
5.000E-01	0.877583	0.805743883	3.56E-02	0.14252	20.0	38.905	18.905	
7.854E-01	0.707107	1.000000000	7.43E-02	0.12051	31.416	81.171	49.755	

Table 1. *Calculated age in 'proper time', AGE = T(χ), for selected astronomical distances (DIST =* $\lambda \equiv \chi a_m$*) based on Humphreys' equation 24 of Ref. 2. Look-back time, LBAGE, is calculated from T(χ) – λ + 6000. This example uses the same parameters as Humphreys, Ref. 2, p. 208; viz.* χ_e *= 45° which gives* $z_e \equiv \cos \chi_e$ *= 0.707107 and the maximum radius of curvature,* a_m *= 40 billion light years. TR, an intermediate step in the calculation, = T(χ) /* τ_m*. The value of* τ_m *is 1091.93 to make the AGE curve pass through a 'proper age' of 8 billion years at a distance of 9 billion light years.*

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References

1. Humphreys, D.R., *Starlight and Time: Solving the Puzzle of Distant Starlight in a Young Universe*, Master Books, Green Forest, Arkansas, 1994.
2. Humphreys, D.R., New vistas of space-time rebut the critics, *CEN Tech. J.* **12**(2):195–212, 1998.
3. Conner, S.R. and Page, D.N., Starlight and time is the big bang, *CEN Tech. J.* **12**(2):174–194, 1998.
4. Ross, H., Humphreys' new vistas of space, *CEN Tech. J.* **13**(1):49–50, 1999.
5. Humphreys, D.R., Russell Humphreys replies, *CEN Tech. J.* **13**(1):50–53, 1999.
6. Duff, K.J., More on vistas, *CEN Tech. J.* **13**(1):53–54, 1999.
7. Humphreys, D.R., Russell Humphreys replies, *CEN Tech. J.* **13**(1): 54–56, 1999.
8. Conner, S.R., Vistas—one more, *CEN Tech. J.* **13**(1):56–58, 1999.
9. Humphreys, D.R., Russell Humphreys replies, *CEN Tech. J.* **13**(1):59–60, 1999.
10. Hunter, M.J., Starlight and time, *CEN Tech. J.* **13**(1):60–61, 1999.
11. Humphreys, D.R., Russell Humphreys replies, *CEN Tech. J.* **13**(1):61–62, 1999.
12. Conner, S.R. and Page, D.N., Starlight—time and again, *CEN Tech. J.* **14**(2):69–73, 2000.
13. Humphreys, D.R., Starlight and time: a response, *CEN Tech. J.* **14**(2):73–76, 2000.
14. Fackerell, E.D. and McIntosh, C.B.G., Errors in Humphreys' cosmological model, *CEN Tech. J.* **14**(2):77–80, 2000.
15. Humphreys, D.R., Errors in Humphreys' cosmological model: Humphreys replies, *CEN Tech. J.* **14**(2):81, 2000.
16. Worraker, W.J., Private communication, 1999.
17. Humphreys, D.R., Private communication, 1999.
18. Anon, Relativity and distant starlight, *Creation* **23**(1):53, 2000.

Russell Humphreys replies:

I'm delighted to see Mr Worraker thinking about my proposal for a young-world cosmology. Furthermore, I agree with him that it does not solve *in detail* the problem of distant starlight in a young universe. I have said many times that my proposal is only a preliminary outline.

By making small adjustments to the rate of expansion, one can make the shape of the curves in his figure practically any shape one wants them to be. Furthermore, the second form of time dilation ('timeless zone'), as I mention in my 1998 *TJ* article, adds new possibilities.

For example, if the expansion rate and timeless zone were similar to what I show in my Figure 1, then we solve many problems. We not only get the proper look-back times and ages occurring within one ordinary day here on Earth, but also we get a way for spiral galaxies to acquire a few hundred million years worth of winding-up in the images we see of them, a topic many people have asked me about (see Appendix, next page).

My main point is that we should move beyond my outline, which can branch out in many directions. I suggest that creationist cosmologists pick whichever branch appeals to them the most, fill it in with mathematical details, and publish it for critiquing.