

# Dante and Einstein Meet at Café Paradiso

## The Conversation That Renewed the Vows Between the Humanities and the Sciences

Using The-i6<sup>i</sup> To Show the Interrelationship Between The Sciences and The Humanities

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“What I most admire about your art, is your universality. You don’t say a word, yet the world understands you!” said Albert Einstein to Charles Chaplin after the 1931 premier showing of his silent film *City Lights*. “True. But your glory is even greater! The whole world admires you, even though they don’t understand a word of what you say”, replied Chaplin.

This dialogue appeared in an article written by Chaplin in the October 1933 issue of “*Woman’s Home Companion*” where, since that time, there have been several versions of this sentiment of mutual admiration. Even more interesting, is that a similar but a more ethereal admiration had existed between Dante Alighieri and Albert Einstein separated in time for over seven centuries.

At Café Paradiso, by chance (or maybe not) Einstein joined Dante in a conversation connecting both poetry and science that changed the world. “What I most admire about your art, is your

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<sup>i</sup> The-i6 (The Inspirational Six) are six strategies we call Animate, Originate, Rejuvenate, Stimulate, Deus Ex Machina, and Tell the Story to establish an engagement between the of the arts and sciences reviving the art-science creative reciprocity by putting into practice positive and effective methods and strategies. These strategies recognize that learning becomes more gratifying with more creative outcomes when educators explore how subjects weave together rather than remaining compartmentalized. (See Nisod Webinar: “Can Science Survive Without The Humanities”; Nisod.org /2019/01/31)

universality. “You write in poetry what your world did not understand!” begins Einstein. “True. But your creation is even greater! Your world appears to understand you, yet they don’t comprehend a word of what you say”, replied Dante. Thus, began the conversation that renewed the vows between the humanities and the sciences.

In 1225, seven centuries before their Café conversation, the beautiful mosaic ceiling of St John’s Baptistry in Florence was begun by the Franciscan friar Jacobus. Little did he know that his mosaic would become one of the most influential artistic works that resolved one of the most controversial subjects in human intellectual history, namely, the conception of a universe that must be “finite” but yet “unbounded”.

The Divine Comedy poetically walks Dante, guided by Virgil, from the depths of the *Inferno* to the Garden of Eden atop *Purgatorio* then, in the hands of Beatrice, to *Paradiso* culminating in a journey through its several levels. Through each level he attains a greater understanding of The Divine until he reaches the edge of the empirical universe, the *Primum Mobile*, as far as any created being can go. Beyond this is the non-material *Empyrean*, the realm of God within a universe that must paradoxically be both finite yet, amazingly, unbounded. In contrast Einstein, in a mathematical journey, reaches the same conclusion with the same astonishing paradox. Influenced by the same mosaic Dante and Einstein, albeit seven centuries apart, envisioned something in common to resolve this interesting contradiction.

Dante’s Universe within medieval Christian Theology is strictly Ptolemaic where Satan reigns from within the Earth’s center surrounded by the concentric circles of the Inferno. Atop this

sits the mountain of Purgatory and above all of this are the concentric spheres of Paradise each occupied outward, respectively, by the Moon, Mercury, Venus, the Sun, Mars, Jupiter, and Saturn the seven heavenly realms. In this regard Dante, consistent within medieval Christianity, requires a universe that is finite in order to place the Earth at a well-defined center point as opposed to an infinite universe with an undefined center. Two problems immediately emerge, namely what lies beyond universe's edge; and, where does a monotheistic God reside? Certainly, if there is nothing beyond the edge, then the empirical universe sits in "nothing" unless "nothingness" is infinite, and one sees the conundrum. Second, if God's reign is unbounded and limitless then a bounded universe itself becomes a problem.

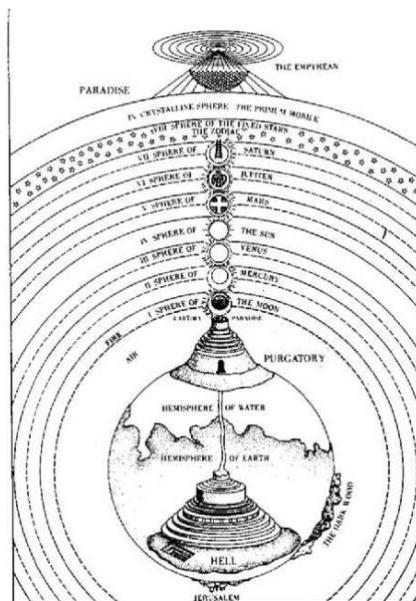


Figure 1 Dante's Universe<sup>ii</sup>

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<sup>ii</sup> All images in this paper are in the public domain in the United States being published (or registered with the U.S. Copyright Office) before January 1, 1924.

What Dante envisioned was a universe encapsulated by the spherical *Primum Mobile*, an unbounded yet a finite geometry predating, by seven centuries, a similar geometric universe envisioned by Einstein. Although they differ on the details, i.e., solar system, universe size, metaphysical significances, etc. they both agree on the fundamental geometric cosmological structure. As such it would be the topic of conversation at Cafe Paradiso.<sup>iii</sup>

At a small table, with a bowl of fruit between them, sit Albert Einstein drinking his Kaffe Haag and Dante Alighieri sipping his Negroni. After exchanging the usual pleasantries, they begin their conversation:

*Dante:* Albert, I understand you and I have something in common.

*Einstein:* Yes, we do! You, as I, viewed the remarkable mosaic ceiling at St. John's Baptistery, where I was reminded of your equally remarkable *Divine Comedy*. But what particularly intrigued me was the third part, the *Paradiso*.

*D:* Interesting for several reasons, aside from the fact that I might not have written *The Comedy*, had it not been for my banishment from Florence, I too was most intrigued by this part albeit for different reasons.

*E: (sipping his decaf.)* I'm not too sure about that, you see your Ptolemaic material cosmology fits perfectly within the confines

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<sup>iii</sup>Several references do suggest Einstein and Dante were directly influenced by the mosaic; however, it is a matter of academic speculation.



Figure 2 The Mosaic And Dante's Spheres

of the mosaic with the *Primum Mobile* at the edge of the universe.

*D:(sipping his Negroni)* Well, Albert I do not really understand how your cosmology fits into mine, although remember I am a man of the 13<sup>th</sup> Century. I'd be most interested to hear how the 20<sup>th</sup> Century Cosmology differs from mine.

*E:* Good question Dante, let me see how to explain this to you. Firstly, we recently discovered that our universe is expanding, we think, without a bound, yet is finite.

*D:* Wait Albert, how is it possible that our universe can be finite yet unbounded?

*E:* Well these were the questions upon which we struggled, the answers to which I hope to explain. (*Holding up an orange Einstein continues*), Consider, if you will, the surface of this almost spherical orange, certainly you agree that the orange is of finite and bounded in space.

*D:* Yes, of course, quite clearly the skin surrounds the pulp finitely.

*E:* Suppose now I take my pen and draw a line on the orange skin continuously without stopping. Certainly, I would be drawing a circle around and around the orange skin without a

clear beginning nor ending point, thus an endless circular journey without bound, yet my pen remains on the surface of a finite sphere.

*D:* Yes, I see what you are saying, for suppose an ant restricted to walk on the surface of the orange could not determine if it was walking on the sphere .... aah ...an unbounded walk on a finite surface! Yes, this too is what I saw in the Mosaic, to place Paradise, bounded by the *Primum Mobile*, to be transcended only by our infinite God.

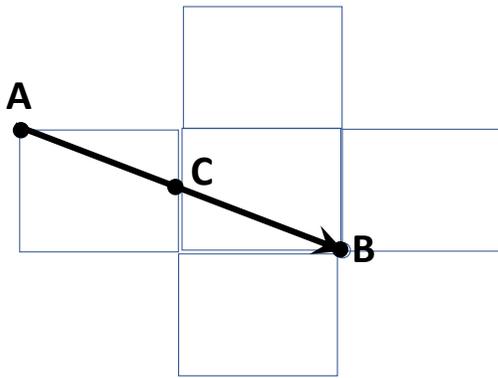
*E:* Excellent Dante. Although we may differ in all the metaphysical essentials, it is within the similarities that our geometries have influenced our understanding of the fundamental structure of the universe.

*D:* How so, Albert?

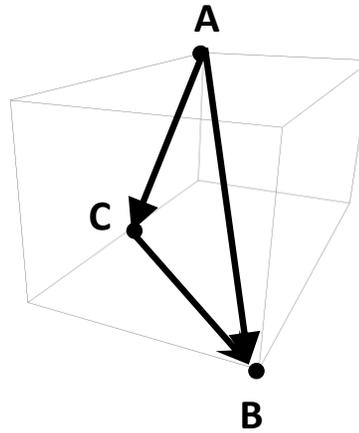
*E:* A distinction in dimension. Let me explain. Viewing the mosaic, as yourself, I saw what appeared to be a set of concentric circles on a flat two-dimensional surface, although I knew it to be on the inner surface of a three-dimensional spherical doom. Let's consider a "thought experiment".

*D:* A what?

*E:* Oh yes, I'm sorry, let me explain. Take a flat piece of paper on a table-top, cut it into the shape of an unfolded box and draw a straight-line connecting points A to B. Next consider an ant walking along this line. Now, fold the sheet to make the shape of the box. (*Einstein draws these figures*):



(a) The ant walks a straight line along the table-top



(b) Folding the table into a box the ant still walks a "straight" line but now crooked in 3-D

*D*: Aah... I see! In two-dimensions our ant walks a "straight line" whereas in three-dimensions it walks... a "crooked" line but ... only to those who can perceive a third dimension.

*E*: Precisely Dante, if a bird where to "fly" from A to B in the box, then the ant and the bird will forever disagree upon who took the shortest straight path. The ant walking from A to B through C perceives their path always to be the shortest straight line. The bird, who can fly within the box directly from A to B along its shortest straight path, perceives the ant's path as a crooked line certainly neither straight nor short, thus befuddling the once obvious concepts of "shortest" and "straightest".

*D:* Yes, one can only fathom what it would be like to be four-dimensional where the projections become our three-dimensional universe. Maybe, just maybe, the Empyrean, lying outside the *Primum Mobile*, in my cosmology is such a projection.

*E:* I do see what you mean Dante, but what is amazing to me is that our two ideas about the structure of our universe, separated by seven centuries, were inspired by the same work of art, the Mosaic of St. John's Baptistery. Well Dante, the evening is late, and I think I'll depart for now, but we have much to discuss.

*D:* Yes, it is amazing and indeed we do! Good evening Albert, I think I'll stay for another Negroni.

As this fictional dialogue illustrates, the separation of the arts and sciences is itself a fiction. Both of our characters were inspired by the same work of art, as such it is critical that our educational system renew this connection. Creativity is impossible without it!