INSIGHT 5.3.2 – 5.3.6

Challenges to Lonergan's Theorem developed in 5.3.1

Lonergan is now going to examine in some detail a variety of positions that seem to be counter to his theorem. To recall, his theorem is that that which explains the immanent intelligibility of concrete Space and concrete Time is "generically" a "set of invariants under transformations of reference frames" and "specifically" the set verified by physicists in establishing the invariant formulation of their abstract principles and laws.

He will thus examine some general positions that would stand against his. In the first three sections (5.3.2 – 5.3.4), he largely focuses upon mistakes resulting from personal reference frames. The first deals with those who would say it is "obvious" from experience that Euclidean geometry is the only true geometry. He then turns to a position developed within Newtonian circles that the immutable is found in absolute space. After address that, Lonergan then turns to a more widely accepted mistake found in common notions of simultaneity.

Following this, he expands more fully into the problem of public and special reference frames as developed in Aristotle, Aquinas, and Newton, and some of the misplacements of the immutable and abstract (5.3.5).

In the end, the primary confusion results, Lonergan argues, from confusing what can be accomplished by the senses and their limitation to the particular, and what can be accomplished by the mind, which can enrichingly abstract from particularity.

(3.2) On to Rationalist Euclideans

Euclidean geometry seem to be verified in concrete extensions. And simultaneity, which Lonergan will address more fully in the next section, seems to be verified in concrete durations.

This seeming verification results in the conclusion that "obviously, Euclidean geometry is the only true geometry."

BUT, the significance of these verifications is anthropological. It is a further question as to whether Euclidean geometry and simultaneity are actually verified in concrete extensions and durations as such.

I.(3.3) Absolute Space

a. Problem of:

i. What is the real trajectory of a penny falling to the floor of a moving train?

ii. Relative to

1. Floor

2.Earth
3.axes of sun
4.receding nebulae

iii.Yet, only one fall.

1.Newton's answer

a.True vs. apparent motions

b.True is relative to an immutable reference frame, absolute space.

c.Motions relative to floor, earth, axes of sun, receding nebulae are merely apparent

d.Proof: The spin the bucket theory

2.Galileo to Newton

Galileo	Newton
Colors, sounds, heat are apparent secondary properties	Observable changes relative position of observable bodies
In contrast, mathematical dimensions of matter in motion are primary, and thus "real" – they are what are left after secondary properties have been removed. Thus, these primary qualities are the really real.	Motions relative to a non-experienced absolute space are real –they are what are left after both secondary properties and apparent motion has been eliminated. Thus, motions relative to this absolute space are really real.

3.Kant: sensible presentations are merely phenomenal. Newton's absolute space is merely an apriori form of sensibility.

4.But Galileo and Newton are looking for absolutes that would be "real" in the wrong place, and in Kant, this movement ends up saying everything is merely apparent.

ii.Lonergan argues that what is real is not data alone, nor insight, but verified insight in data. What is "real, objective, true" is "what is known by formulating and verifying invariant principles and laws.

1.The Penny

a.In any determinate reference frame, there is only one trajectory.

b.Yet, there are many reference frames, hence many trajectories, and though some are more convenient than others, all are valid.

c.No need to have an ultimate, absolute reference frame. This is the result of a misplacement of a heuristic anticipation of "universality" that arises at the level of understanding to the level of experience.

d.Instead, things at particular places and times will always involved relative expressions
e.Why? Because we know the particular through our senses, and our senses are at particular places and particular times.
f.Invariant expressions in contrast are independent of the spatio-temporal standpoint of the thinker. Thus, the principles and laws of a science are invariant, trajectories are not.

II.(3.4) Simultaeneity

a.The problem
i.This is more popular than absolute space. It presumes that something that is simultaneous for one observer should be so for all.
ii.Seemingly rooted in the principle of non-contradition, because the same events cannot be and not be at the same time.
iii.But, what is what is the "now" of the time. What may be simultaneous in one time-frame is not necessarily true in another. "At the same time" may be like "now," "soon," …..
b.Analysis – elementary apprehension (personal reference frames)
i.Duration
1.experiencing over time
2.experienced endures through time.
3.Eg. Man walking across street
a.Distance inspected at once
b.Duration of traversing is proportionate to the duration of inspecting the traversing.
ii.Simultaneous durations
1.2 or more experienced durating events that occur in the same durating experience.
2.Eg. Two men walking across the street together occur in the one durating watching
3.Therefore, simultaneity refers to the "experiencing" not to the experienced.
4.Confirmation: man swinging hammer. Sight and sound are "simultaneous" in one enduring conscious experience of the two, if the listener is close. However, move far away, and the sight and sound are no longer simultaneous.
iii.The solution in Galileo and Newton
1.Apparent simultaneity is not the real simultaneity, which is based in absolute time (thus tries to get rid of observer).
2.This absolute time is not concrete time (Time with a capital T). Concrete Time is an ordered reference frame the includes other concrete durations. Absolute time is outside of experience and is based on a mathematical idea (linked to

similars are similarly understood). Kant reduced absolute time to an apriori form of sensibility, so it too is merely apparent.

iv.Lonergan's response

1.Thus, they are looking for the absolute where it does not exist.

2.No need for expressions of simultaneity to be invariant.

3.Simultaneity is always bound to particular places and times, and thus to the relativity of the observer.

III.(3.5) Motion and Time

a. Lonergan now wants to turn to some challenges to his theorem that are connected to public and special reference frames.

b.Aristotle:

i.Time is the number and measure of local motion derived from successively traversed distances (spinning earth and clocks)

1.2:00 am is number

2.2 hours is measure

ii.But many local motions, and all could yield numbers and measures, therefore many times.

c.Aquinas

i.Saw a problem in the implication of the many times, and sought for one universal Time.

ii.Solution: he turned to the Greek primum mobile, the outermost sphere. It was the ground of all local motions and therefore its time was the ground of all other times.

iii.Lonergan does say that if this outermost sphere exist, it would provide such a ground.

iv. So notice here, even if one could find a fixed temporal (or spatial for that matter) starting point from which all else could be related, there would still exist the further question about the abstract intelligibility of space and time. Such a discover of a fix temporal starting point would not remove the current difficulty about which section 3 in chapter 5 regards. Ron Vardiman in this session had pointed out the possibility of knowing the temporal starting point of the universe, and this could be a starting point (I suppose a bit like absolute temperature). It still however is not the abstract intelligibility of space and time.

d.Copernicus

i.But, the outermost sphere does not exist. The Ptolemaic system was eliminated, and thus no standard absolute time was possible.

ii.New problem: synchronization

1.making many movements yield a single public or special time frame.

2.See diagram

3.Rule: $2t = t' + t''$

a.t=reading of the clock when the light signal is received and reflected
b.t'= reading of the clock at origin when light signal is emitted.
c.t"= reading of the clock at origin when light signal returns.
d.So, what could one do to actually synchronize a clock? Let us say that t' was 0 (this is the time on the clock at the origin at which moment the beam was sent. Then when the ray beam arrives at the second clock and is reflected, one takes note of the time on this clock. One could arbitrarily set t (time on this second clock) to 0. Then, the ray beam arrives back at the origin at t". Let us say that t" = 10. Then plug in the equation. $2t = 0 + 10$, therefore $t = 5$. Hence, go to the second clock, and adjust it accordingly. In this case, one just adds 5 to it. Then one could say that the clock at the origin and this second clock were in sync.

4.However, this is true only if the outward and return journeys of the light signal took the same time.
5.One seeming solution
a.Basic synchronization of clocks that are at rest to the aether in a reference frame that is also at rest in the aether.
b.Derived synchronizations of clocks in moving frames, synchronized with those basic synchronizations.
c.This conforms to Newton's absolute time.
d.But, any number of reference frames could be constructed "at rest", and thus any could be the basic frame, and thus one cannot determine a basic frame nor therefore derived frames.
6.Alternative: Lonergan's solution
a.Special Relativity: Instead of seeking the absolute in the field of a particular reference frame, seek it in the field of enriching abstraction of the principles and laws expressed invariantly under inertial transformations. All reference frames moving with a relative motion, the velocity of light will be the same.

IV.(3.6) Summarizes Lonergan's response: his theorem and anticipated opposition to the theorem.

a.Lonergan's account of the Abstract intelligibility of Space and Time
i.His position is largely based upon the nature of abstraction, in which a principle or law that is abstracted from the empirical residue

cannot vary in its expression with variations of the spatial-temporal frames of reference.

ii. As to the particular, we only know it through our spatio-temporally conditioned senses, which operate at some point instance within Space and Time. Therefore, concrete places and times are apprehended only as relative to an observer.

1. The totalities of places and times can only be embraced through the device of reference frames.
2. The reference frames will be many.
3. Transformations of reference frames can involve changes in the relativity of the place and times of the observers.
4. Therefore it is a mistake to seek the absolute and fixed on the level of particular places and times.
5. So, what is the Absolute relative to Space and Time?
    a. "Abstract propositions who expression remains invariant under permissible transformations of reference frames.?

b. Opposed Positions and Lonergan's explanation of them

i. Try to fix the absolute on the level of sense

1. Aristotle: primum mobile, bounds all space
2. Aquinas: and it bounds time as well.
3. Newton: Absolute Space and Time
    a. Created from imaginary mathematical constructions of reference frames, but it is not actually connected to any particular place and time we can know, hence the reason it is imaginary.
    b. Though to be really out there, really verifiable, but it is not. The bucket theory kicks the bucket.
    c. Metaphysically grounded in omnipresence and eternity of God.
4. Kant: empty space-time of Newton is moved to the apriori forms of sensibility.