

Insight, chapter 5.1 – 5.2.3

- I. The Problem Peculiar to Physics
 - a. Lonergan has been focusing on the sciences in these first chapters for a variety of pedagogical reasons. The sciences provide a type of clarity between image and insight, definitions, higher levels of insights (higher viewpoints), clarification of the empirical residue, clarity in helping us to understand some key features of how the mind works (heuristic structures). Furthermore, the clarity gained from these heuristics structures in turn has allowed him to present the rudiments of a comprehensive worldview.
 - b. The fifth chapter adds some final reflections of Lonergan that help to further clarify the relation of image and insight as well as world process. Physics has the peculiar problem of specifically abstracting from space and time. Its measurements are embedded in a unique way in the empirical residue, and because of this, it has to be able to make some explicit methodological clarifications in order to reach full enriching abstraction from the empirical residue (as Albert Einstein had done). Here is how Lonergan clarifies the problem:
 - i. (1.1) Expressions, proposition
 1. Different expressions of the same proposition
 - a. It is cold and Il fait froid
 - b. $2 + 2 = 4$ and $10 + 10 = 100$
 2. Relative expressions: Same expression, different propositions
 - a. John is here now.
 3. Invariant expressions: same expression, same proposition no matter time and space
 - a. $2 + 2 = 4$
 - ii. (1.2) Why an expression can be invariant:
 1. if abstract, no reference to particular place and time, if no reference to particular place and time, then it contains no element that might vary with variations of place or time.
 - a. Water is H_2O “is” is an abstract invariant tense (not just a present tense of “to be”)
 2. Concrete propositions include references to space and time, hence do vary.
 - a. John is here “is” is a concrete present tense.
 - iii. (1.3) Abstraction in physics
 1. If abstract, then invariant
 - a. “secured automatically in mathematics, chemistry, biology.” – “never arose any tendency to write out the multiplication table or to state binomial theorem differently in Germany or France, in the 19th or the 20th centuries.” (142).

2. But, since physics investigates local movements, it cannot state their laws without some reference to places and times. Therefore, one introduces a problem. These places and times can vary with the speakers position and time. Physicist needs to find “spatio-temporal invariants if he is to employ the appropriate invariant expressions in stating laws of local motion.” (142)

II. The Description of Space and Time

- a. Lonergan is now going to develop an intentional account of descriptive space and time. Description to recall is based on experiential conjugates (hence things in relation to us). So, what precisely are the experiential conjugates constitutive of descriptive space and time?
- b. (2.1) Extensions and Durations
 - i. Elementary experiences of “looking, moving about, grasping, etc..”
 - ii. Duration
 1. Experience: What is Experiences
 - a. looking over time: duration of what is looked at
 - b. moving about over time: duration of what is moved through or over
 - c. grasping over time: duration of what is grasped.
 2. “Descriptively, then, duration is either an immanent aspect or quality of an experience or a correlative aspect or quality of what is experienced.”
 - iii. Extension
 1. Attributed only to what is experienced, not to the experience
 - a. Colors I see
 - b. Surfaces I grasp
 - c. Volumes through which I move
- c. (2.2) Descriptive Definitions
 - i. Space = ordered totality of concrete extensions (hence colors I see, surfaces I grasp, volumes through which I move)
 - ii. Time = ordered totality of durations (duration in looking and looked upon, duration in moving and that through which or over which one moves, duration of grasping or grasped).
 1. Not concerned with just imagined durations and extensions, but concrete durations and extensions (need actually sense experience, or objects of sense experience).
 2. Problem: totality of concrete duration and extension do not fall within the experience of the human race, let alone an individual.
 3. THEREFORE, Lonergan’s definition does not say merely “totalities” but “ordered totalities.”
 - a. What does “ordered totality” mean?
 - i. Actual experience provides an origin from which one can project

1. Hence, “beyond the extension that is experienced, there is further extension; and since it is continuous with the extension of experience, it is not merely imagined.”
 2. Hence, “beyond the duration of experience, there is further duration, and since it is the duration of experience, it is not merely imagined.”
- b. Difference of concrete Space or Time vs. imaginary space or time.
- i. Concrete Space: there is some extension that is correlative to experience
 - ii. Concrete Time: there is duration that is an extension of some nucleus of experienced duration.
 - iii. Both concrete Space and Time have an origin, imaginary space and time do not.
 - iv. What is that construct from an origin?
- iii. (2.3) Answer: Frames of Reference
1. Defn: structures of relations employed to order totalities of extensions and/or durations.
 - a. Personal: One’s personal bodily concrete experience of Space and Time. As I move, it moves. “Here, there, near, far, right, left, above, below, in front, behind, now, then, soon, recently, long ago, etc.”
 - b. Public
 - i. Spatial: “plans of buildings, the network of streets in which they move, the maps of their cities, countries, continents.
 - ii. Duration: “night and day, succession of weeks and months, use of clocks and calendars.”
 - iii. Do not change with individuals change. Translate here and now of individual into a common, public reference frame.
 1. Questions such as “Where am I?” “What time is it?” “What date is it?” expect a public frame of space or time that relates my spatial I, my durational I with a public map or clock or calendar.
 - c. Special Reference Frames
 - i. Need basic position, direction, instance

- ii. Co-ordinate axes are drawn (x, y, z, t)
 - 1. Mathematical: if order imaginary space and time. Hence if one says “Where is it?” the answer will say that any “point-instance” whatever will do (any place in an extension or any moment in a duration).
 - 2. Physical: if order concrete Space and Time. Hence, if one says “Where is it?” the answer will identify some precise point in Space (a place in an experiential extension) and some precise instant in Time (a moment in an experiential duration).