

## **Insight & Beyond**

Class 8, Part 1: October 28<sup>th</sup> 2009

### **“Human Space and Time”**

### **“From Human Space and Time to that of the Sciences”**

#### **Summary of Material**

- Review of previous class: Lonergan defines Space and Time as the ordering of concrete extensions and durations.
- Different kinds of reference frames (personal, social, special) are associated with different kinds of orderings.
- Note that Lonergan talks about both concrete and abstract intelligibility of Space and Time.
- The problem of ordering extensions and durations arises in relation to certain questions.
- These include questions like: “Where am I?”, “Where are you?”, “When did that happen?”, etc.
- We aim to situate our own concrete, limited experience to what is beyond our immediate, sensible experiences.
- We thereby transcend our own limited durations and extensions.

- Personal reference frames relate extensions and durations to one's body and bodily rhythms (such as breathing, heartbeat).
- Class exercise in appropriating one's personal reference frame.
- "Same Space" despite different sensibly experienced extensions.
- Discussion of difference of an adult reference frame and an infant's incomplete reference frame.
- Adults know what to expect, how to integrate where to go, how to relate present vs. absent sense extensions. This is due to enrichment of intelligible organizing by insights.
- Two meanings of present: immediacy of presence in Space and immediacy of presence in Time – i.e. the immediacy of extension and duration – has its origin point in the person.
- Jean Piaget's studies in child development show that children experience and conceive space very differently than adults do.
- Young children start off with various different spaces (mouth-space, hand-space, right- and left-hand space, visual space, etc.) which have to be integrated.
- Visual space and tactile space are separate, for instance, since children have no control over what they see.
- These spaces are gradually formed into a whole as a child learns to relate the various spaces to his or her own body, developing a personal reference frame.

- In Lonergan's view, children gradually have insights into way these various spaces are interconnected and develop orderings systems. For example, a child discovers that it can touch certain objects that have also been flying by its visual field.
- Piaget's *The Child's Conception of Space*. [N.B.: Some slides mistakenly reference one of Piaget's other books, *The Child's Conception of Geometry*.]
- Piaget holds that children organize their personal reference frames in several distinct phases.
- They begin with a topological organization of spaces, followed by a projective organization, and then a Euclidean one.
- He explored the child's conception of geometry at the topological stage by analysing children's drawings.
- Children at the earliest stage, when asked to reproduce certain geometric figures, preserved only the topological features; that is, they were accurate in terms of continuity/discontinuity, enclosure/exclusion, inside/outside, nearness/farness.
- For instance, one child copied a square in a way that marks the four corners; it thus exhibits awareness of discontinuity.
- Further examples of amoeba-like figures drawn by the child preserve all the topology, none of the shapes: outside, inside, and upon.

- The child struggles to reproduce a circle within a triangle, preserving topological features only.
- Student question about whether Piaget explains the order of these insights.
- Piaget actually had extensive and sophisticated explanations of how lower structures were necessary for higher structures to emerge. In this respect his thinking is similar to Lonergan's account of higher viewpoints.
- *Topics in Education* and *Method in Theology* both deal further with Lonergan's uses of Piaget's work.
- Further discussion of the difference between perception and understanding. Perception itself is something that is gradually structured and developed.
- Children see something different from what we see; initially for children, all is "a blooming, buzzing confusion." The first structuring of that into perceptions is topological structuring.
- Lonergan insists that we use our intelligence to construct our perceptions. Even three-dimensionality is a result of insights.
- He discusses the intellectual patterning of spatial experiences in Chapter 6 of *Insight*.
- Piaget also did experiments to show how children perceive and represent objects given to them perspectively.
- For example, a stick and a disc appear very differently from different angles.

- Children initially drew the disc as a full circle, no matter what angle it was given. They later modified their drawings in curious ways that indicated some effort at perspective. Finally they achieve the capacity to see perspectively and draw using a vanishing point.
- In another experiment related to personal reference frames, children were asked to connect up toy soldiers upon a table. They initially did this topographically, later projectively. (They don't project straight lines from one point to another!).
- Student question about the invention of perspective drawing and how cultural influences bear upon our understanding and representation of space.
- Piaget's ideas have been applied to the history of art. Christian Norberg-Schultz drew upon Piaget's ideas to investigate the history of architecture, as we will see later.
- Further class discussion of spatial ordering systems in relation to various cultures and various epochs. People do order their living spaces in different ways, and different kinds of spaces came into being with Euclidean geometry and modern geometries.

- The cultural invariance of Piaget’s account is debated. Lonergan thinks a correct ordering of Space is something to be investigated, it is not predetermined — in opposition to Newton and Kant. Mircea Eliade, Kevin Lynch and Norberg-Schultz will discuss cultural orderings of space and time. Additional discussion of Egyptian art and architecture, and the world-view implied by their preferred method of ordering spaces.
- Kinds of Space and Time: Public Reference Frames.
- The intersubjective ordering of Public Reference Frames brings up more complex questions.
- Not only how my personal ordering goes beyond *my experiences* of extensions and durations, but how my ability to appropriate public orderings goes *my personal ordering* of experiences.
- Public spaces involve insights that organize around “Origins.”
- They allow for locations and dates to be rendered commonly intelligible, that is, publicly shared.
- One’s own personal way of ordering extensions and durations are translated into the ways others order their experiences.
- Piaget’s experiment with three mountains explores how children learn to envision different perspectives of a set of objects, by taking into account the change spatial relationships (in front of, behind, next to, etc.).

- Learning to translate from one reference frame into another is essential to the construction of public reference frames; the latter serve as a larger context for situating personal reference frames, and allow us to translate from one personal reference frame to another.
- Example of map of Boston public transportation system: a topological representation. It displays only continuity and discontinuity (getting on and off, changes) but it nevertheless serves to integrate our bodily orientation into a public frame.
- Questions like “Where am I?”, “What time is it?” and “When did it happen?” are answered differently, depending on whether one asks them in a personal or public reference frame.
- Situated within public reference frame, the question “Where?” implies in relation to an intersubjectively understood and agreed upon Origin.
- Mircea Eliade pointed out that if Space and Time are experienced as completely homogeneous, as lacking any orienting Origin, then they are experienced as a meaningless Chaos.
- In the public reference frame, the Origin points become highly significant for a whole group; they are intersubjectively understood and accepted, perhaps collectively chosen as well.
- They serve as founding moments or points, around which all other extensions and durations are oriented and structured and given meaningfulness in relation to Origins via insights.

- Homogeneous space can be symbolized by endless water, as found in several creation myths.
- Contrast this homogeneous space to one with an origin point, such as an island or an oasis. In *Genesis*, the waters are divided and the paradise becomes an Origin point, making orientation possible.
- Pure homogenous space can be seen as a kind of empirical residue.
- Public space requires a publicly meaningful Origin point.
- There are other kinds of Origins.
- For example, “There’s no place like home.”
- Home is really a group of people, bound to a place laden with associations, experiences, memories.
- Public space is often oriented with respect to home.
- People have their own secret places, their neighbourhood, their hang-outs, their alma mater, etc.
- There are places where life-changing events occur: where one meets one’s love, where warriors have fallen, where people were born or passed away. Such events can all make places into origin points.
- When you ask “Where are you?” in a public reference frame, you’re trying to relate your immediate surroundings to other reference frames, to render them meaningful in relation to some public Origin, to their larger context, or to get back to your origin, etc.

- We cannot talk about Space and Time without also talking about origins, claims Lonergan, and these are not arbitrary.
- Student question about whether these relations are common sense insights, and if so, is it the case that any reference frame beyond my personal one is public?
  - Yes. In a public reference frame there is the issue of the Origin, and then of the relatedness to that Origin. Our organization of public Space is largely topological; suffused with meaningful paths and reference points (landmarks). The phenomenon of being lost has to do with an inability to situate yourself with respect to meaningful places and reference frames. The urban architect Kevin Lynch describes being lost: the circumstances, the emotional consequences, etc.
- Student question of Lonergan's relation to Heidegger.
  - Norberg-Schultz was influenced by Heidegger, along with Piaget, and they have played a major role in the class presentation. Lonergan in *Insight* at least was not influenced by Heidegger, but there are similarities in the treatment of Space and Time. Lonergan made his own distinctive contribution, however, particularly regarding the role of insights in our organizing of extensions and durations. Moreover this enables him to deal with the problem of relativism later on.

- Two main issues are associated with public reference frames:
  - *What* is the Origin, in relation to which other things are made meaningful?
  - *How* other places are related to the Origin?
- Origins must be intersubjectively understood and agreed upon.
- Thus paths and landmarks are required to relate places; they enable these relations.
- The empirical residue (homogenous space) makes it possible for Space to be *publicly* intelligible, mutually understandable, insofar as it is open to hosting a plurality of unique different intelligibilities.
- The homogeneity that Eliade characterizes as Chaos is also the unformed residue out of which can come intelligible organizations that can be understood by a multiplicity of persons.
- In *The Image of the City*, Kevin Lynch discusses the way that public images (common mental pictures), held in people's imaginations, help construct a public reference frame.
- But an image as such is not shareable. It is the intelligible connectedness of images that can be publicly shared.
- Lynch discusses the factors that facilitate or impede a generally shared, intelligible reference frame.
- Namely, a vivid and integrated physical setting helps establish public images.

- Those public images are made possible with the help of insights — makes it possible to hold images in common.
- For example, insights contribute to way-finding and remembered routes. The cultural reference frame of Boston is not identical to the actual layout of the city, but is influenced by a publicly shared reference frame, which contains some points of confusion.

## **Insight & Beyond:**

Lecture 8, Part 1:

“*Insight*, Chapter 5, § 2  
“Human Space and Time”

28<sup>th</sup> October 2009

Class #8, October 28, 2009
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- Review of previous class: Lonergan defines Space and Time as the ordering of concrete extensions and durations.
- Different kinds of reference frames (personal, social, special) are associated with different kinds of orderings.
- Note that Lonergan talks about both concrete and abstract intelligibility of Space and Time.

## Space and Time

**“Let us now define Space as the ordered totality of concrete extensions, and Time as the ordered totality of concrete durations. .... Our concern is not with imaginary extensions or imaginary durations but with the concrete extensions and durations correlative to experience.” (CWL 3, p. 166).**

So just to review last time, *Lonergan gave a definition of the terms Space and Time, the emphasis here on the ordering of the concrete experience: extensions and durations.*

### Kinds of Space and Time

Personal Reference Frames — Personal Orderings  
(Individually Meaningful, Descriptive Spaces and Times)

Public Reference Frames — Intersubjective Orderings  
 (“Socially Constructed “ & Meaningful,  
 Descriptive spaces and times)

Special Reference Frames — Scientific Orderings  
(Explanatory Spaces and Times)

And we talked about *the different kinds of reference frames, and the corresponding different kinds of orderings that were related to those reference frames, personal, public and special.*

The special has to do with problems of the explanatory account of space and time, particularly in the context of Physics.

And I drew attention to the fact that Lonergan is talking about two kinds, or two ways of thinking about the intelligibility of Space and Time, one called the **Abstract Intelligibility of Space and Time** and the **Concrete Intelligibility of Space and Time**.

***Kinds of Space and Time***  
Concrete Intelligibility of Space and Time  
Abstract Intelligibility of Space and Time

And we're going to explore each of those in more detail today!

***Questions for Intelligence***  
Where am I? Where are you? Where is it?  
When did that happen?  
What time is it?

- The problem of ordering extensions and durations arises in relation to certain questions.
- These include questions like: “Where am I?”, “Where are you?”, “When did that happen?”, etc.
- We aim to situate our own concrete, limited experience to what is beyond our immediate, sensible experiences.
- We thereby transcend our own limited durations and extensions.

So we began with observing that Space and Time are in fact answers to questions, questions that we may not have been paying much attention to! And we talked a little bit about *the obviousness of the answers to the questions: Where am I? and What time is it? as: Here and Now!* Exactly why those are not completely satisfactory answers, we're going to look at!

And the reason why there are questions that are questions about Space and Time, questions to which Orderings of Concrete Extensions and Concrete Durations count as answers, has to do with the simple fact that we don't actually see all of Space or endure all of Time at any given instant! And so the question is: of how we relate our actual present experiencings of Extensions and Durations to Extensions and Durations that we're not concretely experiencing! And that's what the Ordering business is doing!

### **The *Problem* of Ordering Extensions and Durations**

**For neither the totality of concrete extensions  
nor the totality of concrete durations falls within  
the experience of the human race,**

**let alone the human individual....**

**Only a fragment of concrete extension and  
of concrete duration falls within human  
experience. Still, one can take that fragment as  
origin. *Beyond* the extension that is experienced,  
there is further extension; and ... *beyond* the  
duration of experience, there is further duration.**

**(CWL 3, pp.166-167).**

So that it is because of our questioning, going beyond our sense experiencing, and our insights coming as responses to our questions about our sense experiencing, that we have this capacity to transcend the limitations of the immediate experiences of Durations and Extensions!

- Personal reference frames relate extensions and durations to one's body and bodily rhythms (such as breathing, heartbeat).
- Class exercise in appropriating one's personal reference frame.
- “Same Space” despite different sensibly experienced extensions.
- Discussion of difference of an adult reference frame and an infant's incomplete reference frame.
- Adults know what to expect, how to integrate where to go, how to relate present vs. absent sense extensions. This is due to enrichment of intelligible organizing by insights.
- Two meanings of present: immediacy of presence in Space and immediacy of presence in Time — i.e. the immediacy of extension and duration — has its origin point in the person.

## ***Kinds of Space and Time:***

### Personal Reference Frames

Where am I? Where are you? Where is it?

When did that happen?

What time is it?

How are *these* extensions and durations related to my body?

But Personal Reference Frames — *As Lonergan says, everybody has a Personal Reference Frame! And it's constituted by how things are related, in the first instance, to our bodies, how extensions and durations are related to my body! So when we are asking, from the point of view of a Personal Reference Frame, Where is something? we're asking from the point of view of how things are related — of how extensions and durations are related to my bodily extensions, and my bodily durations, particularly my heart-beat and my breathing! Those are the rhythms that are fundamental to our lived bodily experience.*

### **Exercise in Appropriating Personal Reference Frame**

“in the same place/space”

Sensibly experienced extensions (vs. objects)

“present” sensed extensions

vs. absent sensed extensions

“present” sensed extensions

in relation to absent sense extensions

So I want to give you all an exercise here in appropriating something about your Personal Reference Frame, your personal Space. So I would ask everybody to stand up!

[Whole class stands up]

And I simply want you to turn to that way,

[Pat gestures to his right]

*your* left!

[whole class turns left]

And now I want you to turn a hundred and eighty degrees in the other direction.

[class obeys]

And now I want you to turn ninety degrees to your right!

[class obeys, all now now have their backs to Pat]

Pat: Are you experiencing right now the same extensions that you were experiencing in the other orientations?

Student: No!

Pat: All right! You can turn around and sit down!

[Some sighs of amused relief as class sits down].

Pat: Right. You notice that — How many of you would say that you're in the same place? ... Good! So you're in the same place, and yet there's some dramatic — One of the reasons why I had you face the back of the room is it's dramatically different in its look than any other part of this room, because it's so bland! It's just a blank wall with a camera hanging in it!

So the concrete extensions and durations — the concrete extensions that you're actually experiencing change from one orientation to the other! Nevertheless, you think of them as being parts of the same space, the space of this room! *That sameness is not something that you know by seeing the sameness! That sameness is something that you know by adding on to your sense experiences of the extensions, the extended bodies, the extended objects that you saw!*

I just said ‘objects.’ *But I want to focus on the fact that what you actually saw was sensible extensions, not objects. Sensible extensions, that’s what you actually saw! But the fact that you also understand yourself to be observing some things about objects is a further addition! What you’re actually sensing is extensions!* You further add on to that that those extensions are of the same objects! That the walls are the different walls of one and the same room. *So to call the room an object, or to call the chair an object, or to call another person in this classroom an object, you’re adding something on over and above the actual sensations of the extensions.* And I asked you to do that exercise so that you had a sequence of very dramatically different sensations, and yet it doesn’t bother any of you! None of you thought you left the room, *or that* you went to a different room when you turned round!

Now that’s not true of babies! That’s not true of infants! Their notions of space in their first few months are very, very much tied up with the immediacy of their experiencings. It takes a good two years for children to begin to organize their different experiences of extensions into a Personal Reference Frame.

*And in addition to that, we organise not only those aspects of our sensations that we experience, or that we could experience really quickly by turning left and right, so that you know what to expect by turning left and you know what to expect by turning right, and you know what to expect by turning around, more or less! That knowing what to expect is a matter of insights, the insights that we can add — that you’ve added to your actual experiencings of extensions and durations. And in addition to that, you also have as part of your Personal Reference Frame how to get from the space that you’ve organized that we call “this room,” to the stairs, from the stairs either up or down to wherever you’re going after class is over!*

*So in addition to the fact that you have organised the space in this room into an ordered intelligible set of connections, the experiences the concrete extensions of the experiences that you’re having right now, are also intelligibly related to places distant — even quite distant! You’ve already got this room, your body situated in relationship to other things. As far as you are thinking of how am I going to move my body: is it to the right? is it to the left? do I have to go up? do I have to go down? do I have to turn around? all those are parts of the way in which you organize your Personal Reference Frame! It’s all in relationship to your body!*

And in addition you're organizing your Personal Reference Frame in terms of the present! *The present here means two things. It means **spatially present**: it means the spaces that are within your sight, or possibly even within your grasp, the grasp of your hands!* 'Present' also means **present in time**. And so there is a collapse of *the immediacy* of presence in space and *the immediacy* of presence in time — *the immediacy* of the duration and *the immediacy* of the extension — that is the origin of your Personal Reference Frame. Okay?

- Jean Piaget's studies in child development show that children experience and conceive space very differently than adults do.
- Young children start off with various different spaces (mouth-space, hand-space, right- and left-hand space, visual space, etc.) which have to be integrated.
- Visual space and tactile space are separate, for instance, since children have no control over what they see.
- These spaces are gradually formed into a whole as a child learns to relate the various spaces to his or her own body, developing a personal reference frame.
- In Lonergan's view, children gradually have insights into way these various spaces are interconnected and develop orderings systems. For example, a child discovers that it can touch certain objects that have also been flying by its visual field.

Now the work of Jean Piaget, and the genius of him, is to have been able to trace, and in large measure to infer, what's going on with children before they are able to speak about some of the things that they are experiencing as they put their spaces and times together!

**Jean Piaget**  
***The Child's Conception of Space***  
The problem of integrating different spaces:  
mouth-space  
right- and left-hand-space  
visual space  
other body-part spaces  
hearing-space  
body-moving space

One of the earliest things he did was to propose — and *I* think he is quite accurate in this — to propose that children actually start out with lots of different spaces! That children start out — *First and foremost, the most important space that children have is the mouth-space!* It's important because they — that's where they get their nourishment. That's where they get their sense of — *In addition to their physical nourishment, it's where they get their sense of being accepted and being loved and having a place of security and safety. All that comes together through their mouths!* And so one of the most important things that they have is *a mouth-space!* They also have other spaces. They have a left-hand space; they have a right-hand space; they have a foot-space; they have a belly-button space; they have a shoulder-space; they have arm-space; they have a head-space! *Their initial spaces are not integrated with one another!*

Importantly, in addition to the spaces that have to do with touch, and grasping, and bodily motion, *they also have a visual-space!* *And the youngest children do not have any control over what they see!* Early on they start to be able to move their heads, but not in a coordinated fashion! They look rather spastic. And really little kids don't have the muscle strength in their necks to be able to hold their heads erect, or to be able to turn them at will in

any predetermined fashion. So there is a sort of a way in which they are the victims of their nerve impulses and their muscle impulses! *What they see is whatever happens to pass in front of their eyes.* That means that it's a space that's quite independent of anything they can do with their hands! Which initially they can't do very much of that either!

So one of the things that children are doing when they are very little is *that* they are learning how to have insights into the interconnections among these different experiences of extension, whether through grasp, or sight, or by implication the space of sound, the auditory space, and so on! *So gradually children learn how to put these different spaces into an organized whole!* And this is — *Piaget's work is on the development of intelligence!* He uses some insights from mathematics, particularly Group Theory and Abstract Algebra, to be able to give an account of the different stages that children pass through: what combinations, what connectednesses it is that they are able to perform.

*Lonergan would say that they're having insights.* I think Lonergan is right in this regard! Piaget might or might not agree with that! He may think it's irrelevant given his approach. But nevertheless, what I think is going on here is that children are having insights into interconnectednesses!! And as they do this, they are developing the orderings of their experienced extensions in relationships to their bodies! They're organizing the various extensions of their bodies, and of the experiences of their bodies, and things that they experience in relation to their bodies, into an ever more organized whole!

One of the things that Piaget says is that a big discovery for a child is that that thing that keeps flying by in space: "Uh, I can touch that! That's my hand!" So children discover that their left-hands can touch their right-hands, that their right hands can touch their left-hands, their fingers can go into their mouths; and they begin to discover, through this series of experiences, they begin to have insights to put those together! And the big one with children is *when they began to* develop the ability to be able to reach out and touch certain objects, which they can't do when they're really really little! Then those — It's a little bit like going to a movie and watching the movie go by: you can't actually get into the movie and make things happen! *There's a big transformation that happens when children discover that it's not just a movie, but it's a world in which they live and move and have their being, and that they can actually interact with those visual things!*

And Piaget's just got these endless examples and complex structures that develop as children have the insights that help them organize their Personal Reference Frames.

- Piaget's *The Child's Conception of Space*.

[N.B.: Some slides mistakenly reference one of Piaget's other books, *The Child's Conception of Geometry*.]

- Piaget holds that children organize their personal reference frames in several distinct phases.
  - They begin with a topological organization of spaces, followed by a projective organization, and then a Euclidean one.
- He explored the child's conception of geometry at the topological stage by analysing children's drawings.
  - Children at the earliest stage, when asked to reproduce certain geometric figures, preserved only the topological features; that is, they were accurate in terms of continuity/discontinuity, enclosure/exclusion, inside/outside, nearness/farness.
- For instance, one child copied a square in a way that marks the four corners; it thus exhibits awareness of discontinuity.

**Jean Piaget**

***The Child's Conception of Space***

Development of children's intelligences

Topological: Earliest construction of spatial relations

Projective: Intermediate spatial relations

Euclidean: Mature construction of spatial relations

*And Piaget says that children's organizing of their spaces goes through several very significant types of transitions! And one of the transitions, the sets of transitions that he traces, is that the children begin with a topological organization of spaces. Now I'll explain what that means in a moment. But they don't start out with Euclidean space! Children's first spatial organizations are topological! Then they move on to a quasi-projective organization of spatial relations. And it's only at a very sophisticated level, a mature level, that they have something like what we have come to call the Euclidean organization of the extensions!*

**Jean Piaget**

***The Child's Conception of Geometry***<sup>1</sup>

Topological Stage

So here's an example — It's one of the experiments that he did with a series of children to discover and make the case for this development of different kinds of organizations of spatial relationships. He showed children individual drawings of these figures [as on the left-hand side of the slide]. And then he asked them to reproduce the drawings. Now, this is a sort of a second level: because it's one thing to be able to organize

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<sup>1</sup> This probably should be entitled *The Child's Conception of Space*.

the extensions and durations; it's another thing to be able to translate what you see and have organized into a set of arm-motions where you can actually draw them.

- Further examples of amoeba-like figures drawn by the child preserve all the topology, none of the shapes: outside, inside, and upon.
- The child struggles to reproduce a circle within a triangle, preserving topological features only.

Jean Piaget  
*The Child's Conception of Geometry*<sup>2</sup>  
Topological Stage

*It turns out that one of the hardest things to draw is a diagonal line!* And the reason for that is **that** your elbow and your shoulder are not naturally designed to draw straight lines at all, and especially not a diagonal line. The reason — What they're designed to do is to draw curves, because you pivot around your elbow or you pivot round your shoulder. But to draw a diagonal line, what you have to do is a series of adjustments; you have to constantly move to the left and down to the left, in and out [**Pat demonstrates by mimicking the movements that would be required**]! So you have to move both joints in a series of coordinating efforts! *So drawing a diagonal is not a particularly easy thing to do!*

But *Piaget showed these figures; then he asked the children to reproduce them. And he observes that at a certain level, children don't have any ability to do anything like a representative reproduction from what they see to what they draw; because they don't have even the ability to mimic a straight line, and so on!*

**[Right-hand side of the display slide is added.]**

But *here's what he showed and here's what some of the children did!* And I just want you to notice that — So the circle they were able to do fairly well [**model 4 and its copy**]. As I said,

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<sup>2</sup> This probably should be entitled *The Child's Conception of Space*.

that's kind of a natural thing that your — the pivots in your arms will do! [Pat mimics the circular movements required to draw a circle.] *But notice over here [model 6 and its copy] that's how the children at this stage of development drew the triangle.* Now, that's kind of silly, isn't it?

[Some laughter]

*Except it's not!!*

[Some additional laughter]

— *Because that's a level of achievement! Prior to this stage of their development — which is about somewhere around three years old — they can't do even that! Now what's interesting about doing that representation as the representation of a triangle is that it preserves the topological features of a triangle, without preserving either what he will call the projective, or what we know as the Euclidean features of a triangle!*

*The basic topological organization has to do with continuity and discontinuity, and that means with enclosure and being inside and outside, being continuous and discontinuous, being near and far! So that is a topological transformation: it's a closed figure! What they've succeeded in doing is in recognising and drawing it as a closed figure! And that takes insight to be able to do that! It takes other kinds and additional kinds of insights to do more than that. But that's one of the things that is characteristic of the achievement of a topological construction!*

There's another one here that's interesting! *It's sort of an intermediate stage.* It's this one right here [model 5 and its copy]. That's a copy of the square! *But there's something added.* Now why the child didn't do it on the triangle, but did it on the square? Well Piaget has some discussions of that.

But what do you notice about “Copy of Square Model 5”? What's different about it in comparison to the copy of the circle and the copy of the triangle? ... Donau?

Donau: It's got lines coming off of it!

Pat: It's got lines coming off of it; and lines doing more than coming off of it ... ?

Student: They're at an angle. Isn't there an angle there?

Pat: They're at an angle, yeah. ... Yeh, Joe?

Joe: They're parallel. Or if you extended them, they would be.

Pat: Yeah, yeah. So that — So they've got some orientation to them.

Mary?

Mary: I was going to say that they're parallel, and you know, the same shape and size pretty much.

Pat: That's right! Very good, very good! Mike?

Mike: I think the child would have had to pick up his pen to do the lines.

Pat: Very good! Very good! And picking up the pen is an exercise of what? ... I said that topology has to do with continuity and discontinuity, enclosure and exposure, the inside and outside. So if Byrne says "Pick up your pens!" there's a —?

Student: — Discontinuity.

Pat: Discontinuity, right! Right! ... Ah, somebody over here? Mike?

Mike: Just one of them is straight. And so you said that previously to making something straight, they make circles. And the other **point**: it goes from inside to outside of the circle, and that is different!

Pat: Right, right! *So what the child is doing is recognizing a certain kind of discontinuity that is exhibited in the square.* Why that's not recognised in the triangle I forget. But *the child has marked discontinuity.* He is making a transition towards being able to draw a straight line. But because to draw a *long* straight line you have to do a lot of adjustments with your elbow and your shoulder, you can do a short straight line; **which is what he does.** *And so what the child has done is to preserve certain quasi-topological features of the square in that drawing!*

I'll take a look down here [**referring to lower right-hand of the slide**] at these three: the models one, two and three. Those are the sort of amoebae figures that Piaget drew himself. Take a look over here [**at model 1**]. You will notice that that is a little tiny bud outside of the amoeba. It's close, so it's near, but outside! This one is close and inside [**model 2**], and this one is intersecting [**model 3**], so it's on! *And notice what the child has done, preserving what we would say, none of the shape but all the topology of those three figures!* So the smaller figure, **the little bud**, is consistently either *outside* the enclosure of the larger, or *inside* of the enclosure of the larger, or *on* the enclosure of the larger one. *This*

*Loneragan would say is all a matter of children's insights, having the insights into the topological relationships of nearness, farness, inside and outside, continuity and discontinuity!*

This one [model 12] is also quite interesting. This one corresponds to this figure over here [copy of model 12]. Notice also that what the child has done is to preserve the inside-outside relation of the original drawing. The touching phenomenon that's going on in the original model is not found in the drawing — It's very difficult to get two circular figures to touch one another only at three points! What the child has got is the inside-outside topological relationship!

- Student question about whether Piaget explains the order of these insights.
- Piaget actually had extensive and sophisticated explanations of how lower structures were necessary for higher structures to emerge. In this respect his thinking is similar to Lonergan's account of higher viewpoints.
- *Topics in Education* and *Method in Theology* both deal further with Lonergan's uses of Piaget's work.
  - Further discussion of the difference between perception and understanding. Perception itself is something that is gradually structured and developed.
- Children see something different from what we see; initially for children, all is “a blooming, buzzing confusion.” The first structuring of that into perceptions is topological structuring.

- Lonergan insists that we use our intelligence to construct our perceptions. Even three-dimensionality is a result of insights.
- He discusses the intellectual patterning of spatial experiences in Chapter 6 of *Insight*.

Okay. Do people have questions about that diagram? Okay, Jem?

Jem: I had a few, in terms of — I just wondered if Piaget gives an explanation of why those particular insights should occur earlier than the others. It could be — And I ask because there's a sort of a way of thinking about perception and understanding that would say that the recreation of what is seen would be easier than to make a recreation of relations, which seems like it has more elements involved. It would be more complex; that that sort of understanding would come later, because just for quantitative reasons, there's just more things to work out and establish, there's two objects instead of one! Is there some explanation of why those kinds of intelligibility are grasped earlier?

Pat: Ah, yes. Piaget actually has a very complicated, sophisticated treatment of these things, and he's written — He wrote something like seventy books. And he treats different aspects of children's cognitive development in different books. Some of them repeat things that he said in earlier books. *But he does have an analysis that earlier structures are necessary for a child to master before they can move on to more complex structures which would roughly correspond to what Lonergan calls "Higher Viewpoints."*

Jem: Uhm!

Pat: He would suggest that *you need the operations of the lower to be the elements that are then operated on to have operations that operate upon operations!* That's sort of a way that he proceeds. *And he has this analysis as to groupings! He argues that an operation has to have certain qualities to it, and you have to master it before you can go on to the next one!* And he gives an account — he asks and answers a lot of questions about this!

Another student: Lonergan gives sort of a short version of that in *Method in Theology*, doesn't he?

Pat: Yes, he does! A short version of that. That's right! And he does have a little bit more to say about it in *Topics in Education (CWL 10)*. So yes he does. The details — There's a lot of stuff in today's class that people might find interesting to explore for papers. I have found my reading of Piaget to be enormously enriching!

But I do want to go back to one thing that I think you said, if I heard you right. And it was something about the — You had something like a distinction between perception and an intellectual operation on a perception. I wasn't quite sure how you put it.

Jem: I think I referred to perception and understanding, just in the sense of — So I'll just explain it a little bit maybe! So if there's a triangle (**model 6 and its copy**)! There's a sort of understanding of perception and understanding in which — In order to recreate that, I would look at what's there, and then recreate it.

Pat: Okay!

Jem: But then in the later ones where you have two elements, you have sort of the big circle and the small circle (**model 12 and its copy**). And you get to put them in a relation. It seems based on that sort of an understanding of perception and understanding, that it would be more complicated because you have more elements to put into relation than just what's seen.

Pat: Okay! That's quite right! What you said is quite right! But what I want to do is to go back to the distinction between perception and understanding. The earliest work that Piaget did — or at least one of — *The work that he does on the earliest stages of the child's development is an argument that our perception is itself structured and develops. It comes as something of a shock to quite a number of people when they are confronted with Piaget's thesis that children don't see what we see! That their seeing is structured; that their seeing goes through the same structuring as their drawing does, but just at an earlier stage, and with regard to a different set of operations!* That children actually —

*We saw this a little bit already when we were looking at the structuring of observations by scientists. It's a generalizable human phenomenon!* That children — Piaget's argument is that children don't see things Euclideanly at first; they see things

topologically. Initially it's just a booming, buzzing confusion, but the first kind of ordering that they order is the inside and the outside! It has a lot to do with things going in their mouths! But the most fundamental thing that children are doing — If you watch a child in their first year of their life, everything goes in their mouth! Why? *Because that is the fundamental sense organ!* “It looks like that. I wonder what it really is? Oh, that's what it's like!! [Pat gestures as if putting an object in his mouth].

[Laughter]

Now I really know what it's like!!” And so we all did that! I did too!

[Laughter]

*So this is what Lonergan means in those short sentences that he has about Personal Reference Frames. That we are using our intelligences to construct our perceptions! And then eventually to construct the ever richer set of perceptions that we bring to bear on things! The very idea that something — Well, we'll actually talk about this in a minute! Let me skip over that!*

Three dimensionality is something — *We see things as three-dimensional, but that's itself a seeing that's informed by the acquisition of a whole bunch of insights. Or as Piaget would say, certain kinds of schemata, schemes of intellectual development. So it takes a while to get used to this, but children don't see what you see! All of our seeing is informed and guided and organized by our intelligence!*

You've read for today in Chapter Six something that we will return to later today or next week, about *patterning of experiencing*. *There is nothing automatic about the way in which electrons and protons impinge upon our bodies that cause us to see in certain ways! There's nothing automatic about it! It's an interaction between the physical effects on our biological organism and the seeing-like activity that we bring!*

So there's a patterning that we're doing — *What we're looking at here is the intellectual patterning of spatial experiences, the intellectual patterning of extensions into certain kinds of organized structures. Okay?*

- Piaget also did experiments to show how children perceive and represent objects given to them perspectively.
- For example, a stick and a disc appear very differently from different angles.
- Children initially drew the disc as a full circle, no matter what angle it was given. They later modified their drawings in curious ways that indicated some effort at perspective. Finally they achieve the capacity to see perspectively and draw using a vanishing point.

Jean Piaget

*The Child's Conception of Geometry*<sup>3</sup>

Projective & Euclidean Stages

This is another experiment that Piaget did. And I need to explain the top — I'm not showing the diagram that he gives that illustrates what he showed to children; just how they drew things! But over here on the left-hand side at the top are their drawings of what he called a needle. It was really sort of a tinkertoy,<sup>4</sup> maybe a nine-inch tinkertoy. And what he did was to show them the needle like this [Pat holds up his pen by the base so that it is erect], and then rotated it down like this [Pat rotates his pen forward from its base towards the class]. Or what he actually did is to ask the children how it would look to somebody else. And the earliest children just drew, no matter what orientation the needle had — and I'm tipping my pen towards you folks, so it should be getting smaller in extension as you actually experience it. Now notice what happened when I just did that! Because you will probably agree on

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<sup>3</sup> Perhaps this should be entitled *The Child's Conception of Space*.

<sup>4</sup> A tinkertoy is part of a construction set of toys for children.

somewhat doing what children do, which is to just think of it as one solid five-inch entity. [Pat turns the pen downwards while facing the class] And even though it no longer looks to your actual experiencing of extension as five inches, you're tending to think of it as five inches!

We'll come back to this when we talk about bodies and things, about privileged profiles, and how we use privileged profiles and privileged perspectives to interpret and to characterize things in ways that bring us into oversights of insights, but this is one example. So —

The children in the top row are able only to initially depict, no matter what angle this needle is at, to depict it at the same inclination, no matter what [A C E on left]! Then a little later on what they are able to do is to “Well, it's like this or like this!” [Pat displays his pen alternately as vertical and horizontal as in A C at top middle]. *But they don't really have a way of organizing the actual extensions, the various extensions — their organization of their experiences of extension are somewhat stereotypical!*

Down here in the middle [left-side A B C D \*E] what you see is a child who is able to characterise how it looks as it tilts down. But notice what's happening! The child is actually seeing it like this [tilting down to face the child so that in the end, the child sees only a tiny circle], but is drawing it like this [tilting from vertical to left]. *So it has a funny kind of difficulty in getting its perspectives organized!* And you know that it's looking at the end point, because finally when at \*E it's coming straight on, the child can just see the point of it. And this is the point and you can do that, but then the intervening things it draws it at an angle.

The other example that Piaget gave was a disk, and he rotated it [Pat holds up a circular plastic plate facing the class, and tilts its lower half towards the class and its upper half towards himself], or he would put a doll and put the doll at different angles, and ask the child to draw how it would look to the doll. Now you may be still thinking of it as a circular plate, but what you're actually seeing is a cigar-shaped ellipse! And so you will notice that the child initially, no matter what angle it's at, draws them in circles [top right-hand of slide]. And then he goes through an intermediate stage [Intermediate level 11A-11B] and notice they're getting smaller. But he's only able to organize one dimension of the smallness! So it's getting smaller, but it's just shrinking as a circle. *So there is still the visual extendedness*

*of circle that's dominating its vision!* And then finally, it gets to some kind of an interesting thing where it doesn't have mastered the full symmetry of an ellipse, and then to make it smaller the child cuts it in half [**lower middle right hand side**].

The other example that's here is another illustration. This one has a little bit more to do with what he's interested in — this *transition from topological organization to a projective organization*. And the child was asked to draw what a railroad track or a boulevard with trees on it looks like, from the point of view of standing on the road or on the railway tracks looking down. And the children initially can preserve the topological features, even though they haven't got the perspective mastered [**second row centre**]. At the second stage, you can see [**penultimate row centre**], there's kind of an intervening — they know it converges towards the end, but they don't have a way of organizing the intermediate stages, so that's part of what he means by projective. Then finally, the last stage [**bottom**], the child has what we would call a point of view, a vanishing point: the capacity to draw the way it actually looks. But that doesn't mean organizing extensions as experienced in certain ways!

Learning how to paint perspectively is not a simple thing to do! So *children first of all have to learn to see perspectively*; and to recognize that thing that for example Descartes talks about, that the little figure way off in the distance is actually a six foot figure; it just looks little! And so you can make that adjustment! But *then to be able to draw it involves repeating the same set of intellectual organization, but now instead of with regard to your immediate experience, with regard to your capacity to draw!* Okay? Okay!

• **In another experiment related to personal reference frames, children were asked to connect up toy soldiers upon a table. They initially did this topographically, later projectively. (They don't project straight lines from one point to another!).**

Any questions about that? ... Personal Reference Frames: how things are related to my body! There's another interesting thing where he asks a child to — Along a table, he puts a little soldier at one part of the table, a little soldier at another part of the table, where the — so that the straight line would be across the corner of the table. And he asks the child to take five out of ten of the other soldiers to form a straight line between the two end points. And

the children do all kinds of things. They start out and they use a topological organization. They take the first soldier and put the second soldier next to it; then they look at the second soldier and they put the next soldier, and it snakes around. Now, they'll eventually get there, but it does this kind of winding path [Pat illustrates with hand gestures] to get there, because they're topologically oriented; they're thinking in terms of what's near and what's continuous! Then the next thing that children can do is they form the structure around the corner; so instead of taking — instead of drawing what we would call a straight line, they draw a kind of straight line which takes the corners of the table as their frame of reference. The big insight that they have in order to be able to do this is you have to put yourself as one of the soldiers. You have to get down [Pat hunkers down to level of soldiers on the table] and sight along the two soldiers that you've got, so you become the  $n + 1^{\text{th}}$  soldier!

[Some laughter]

Once you're able to do that, then you've got something like a projective ordering of space and time. But up until then, it's all done in terms of continuities and discontinuities, and nearness and farness, and inside and outside!

- Student question about the invention of perspective drawing and how cultural influences bear upon our understanding and representation of space.

– Piaget's ideas have been applied to the history of art. Christian Norberg-Schultz drew upon Piaget's ideas to investigate the history of architecture, as we will see later.

- Further class discussion of spatial ordering systems in relation to various cultures and various epochs. People do order their living spaces in different ways, and different kinds of spaces came into being with Euclidean geometry and modern geometries.

• The cultural invariance of Piaget’s account is debated. Lonergan thinks a correct ordering of Space is something to be investigated, it is not predetermined – in opposition to Newton and Kant. Mircea Eliade, Kevin Lynch and Norberg-Schultz will discuss cultural orderings of space and time. Additional discussion of Egyptian art and architecture, and the world-view implied by their preferred method of ordering spaces.

Somebody had a question! ... Matt?

Matt: Does Piaget speak at all about the History of Art, or anything regarding this vanishing point? That doesn’t really appear until the second millennium.

Pat: I’m sure he does. I don’t know! I don’t know the answer to that! He probably does. And people have used Piaget’s ideas to talk about the History of Art. We’re going to talk a little bit later about the historian of architecture, Christian Norberg-Schulz.<sup>5</sup> He definitely uses Piaget’s ideas to investigate the History of Architecture! So I’m sure that people have — I’m not familiar with anything [that has it](#), but I’m sure there’s some literature out there. Whether or not Piaget himself did this, I’m not sure. Not in what I’ve read.

Matt: Right!

Pat: Stephanie?

Stephanie: That was actually pretty much my question. And you see it’s like, the way it’s structured here, it almost sounds like: getting to the point of perspective drawing is necessary in order to reach a certain level of intelligence. But perspective drawing hasn’t been around that long. So at least not, you know, for the entire existence of human beings. So it does raise interesting question about what that would say.

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<sup>5</sup> **Christian Norberg-Schulz** (1926–2000) was a Norwegian architect, architectural historian, and theorist. Though Norberg-Schulz had practiced as an architect in his home country, he is well-known internationally both for his books on architectural history (in particular Italian classical architecture, especially the Baroque) and for his writings on theory.

Pat: Yeah. It does! And part of his argument is that people organize their visual and their lived spaces in certain ways. And that the kinds of conceptions of space that come into being with Euclidean geometry and with modern geometries presuppose certain levels of operation, which would include projective! That's the nature of his argument. He — There has been a line of criticism of Piaget's work as to how culturally invariant it is!

And — Well, let me sort of jump ahead a little bit to where Lonergan ends up when he's talking about the “**Abstract Intelligibility of Space and Time**” (CWL 3, pp. 172-184). *Lonergan's argument is that there isn't anything about extensions and durations as experienced that predetermines what is the right ordering. The right ordering is a variable to be discovered and to be investigated to find out which it is! He's going to argue against Kant and Newton and Galileo that they have a presupposition about an absolute ordering that is given and determined. And what Lonergan is doing is to make the argument that that's not the case! That we have to actually discover the ordering!*

Now, we're going to see with Eliade, and Kevin Lynch, and Christian Norberg-Schulz, that they're going to talk about cultural orderings of space and time; and that those can be quite various as well! So that people are able to draw in perspective in the way that is exhibited at the bottom of that diagram [**Projective & Euclidean Stages slide**] doesn't mean that people that they don't have that as part of their cultural resources aren't intelligent! That's sort of a long-winded way of saying that.

Stephanie: Right! And what comes to mind would be like the Egyptians, who drew kind of flat, non perspectival hieroglyphic drawings. And then they build pyramids! So there's kind of a disconnect there, I guess.

Pat: There is! We're going to talk about pyramids in a few months I hope. So there — Yeah! There is a — What's his name? ... Christian Norberg-Schulz has some observations about the different world orderings that are characteristic of Egyptian versus other civilizations. And he doesn't say that they're dumb and they don't have insights, but he does have an argument that there is a fundamental rule [**word unclear**] that is gone beyond by successive civilizations! And make of that what you like! He does — It's not quite as simple as they can't draw in perspective, because they could have! The Egyptians could! They couldn't have built the pyramids if they couldn't do that!

Other questions? ...

- **Kinds of Space and Time: Public Reference Frames.**

- The intersubjective ordering of Public Reference Frames brings up more complex questions.
- Not only how my personal ordering goes beyond *my experiences* of extensions and durations, but how my ability to appropriate public orderings goes *my personal ordering* of experiences.
- Public spaces involve insights that organize around “Origins.”
- They allow for locations and dates to be rendered commonly intelligible, that is, publicly shared.
- One’s own personal way of ordering extensions and durations are translated into the ways others order their experiences.

So that is to give you a little bit of a feel for the role of insights in the construction of Personal Reference Frames. Your own Personal Reference Frame is enormously complicated! And it’s enormously complicated by the number of insights that you had. You had to have the insights to constitute your topological orderings of things in relationship to your own body! And then you had the advance upon those which were projective. And then to the Euclidean to the extent that our orderings are Euclidean!

And there are some questions about, and whether it’s the case just in our ordinary living. We tend to presume that they are Euclidean, but whether or not they are is something that some people — Some anthropologists have done some interesting work.

Moving on to Public Reference Frames!

### ***Kinds of Space and Time:***

#### **Public Reference Frames**

Where am I? Where are you? Where is it?

When did that happen?

What time is it?

The Intersubjective problem of Ordering  
(making meaningful, “social construction”  
= “***generally intelligible locations and dates,***” (CWL 3, p. 168))

*Structured* [insights] around “***Origins***”

(CWL 3, p. 167)

Public Reference Frames involve the more complicated set of issues about intersubjective ordering, making meaningful, which is to say what people call “social construction” — I think I mentioned this briefly last week — making locations and dates generally intelligible. ‘Generally’ in the sense of people sharing and ordering of their experiences of extensions and durations. *This means among other things, being able to translate your experiences of extensions and durations and your orderings of your experiences of extensions and durations, into somebody else’s orderings and experiences of extensions and durations. It might seem impossible, but in fact we do it all the time!*

*So the intersubjective problem is how to go beyond not just my experiences of extensions and durations, but how to go beyond my way of ordering my extensions and durations to your way, and their way, of ordering extensions and durations! And Lonergan says that this is a matter of space — extensions and durations being structured by insights around origins. I highlighted the word ‘Origins’ here [in the slide], for reasons that I hope*

will become clear in a moment. *But what I want to emphasize here is that public spaces, public reference frames, are ways of making meaningful intersubjectively our experiences of extensions and durations.*

- Piaget's experiment with three mountains explores how children learn to envision different perspectives of a set of objects, by taking into account the change spatial relationships (in front of, behind, next to, etc).
- Learning to translate from one reference frame into another is essential to the construction of public reference frames; the latter serve as a larger context for situating personal reference frames, and allow us to translate from one personal reference frame to another.

**Jean Piaget**  
*The Child's Conception of Space*  
Transformations of Intelligible relations

And this is another example from Piaget. In this diagram — The bottom diagram is a look at this experiment that he gave. He built three mountains — or at least somebody built, probably his graduate students, built three mountains out of paper mâché [upper part of slide]. And I've written — this is from my book — so I've written on there — The mountain here on the left is coloured brown, pink-brown, and it has a little cross on the top of it. The mountain on the right is coloured green and it has a little chalet on it. And the mountain in the back is coloured grey, and it has some snow on top of it!

And what Piaget did was to have a child sit in a chair, usually over here at A [Pat uses his pointer] or along the orientation looking from A, so that they would see the visual

panorama more or less like we see in the upper frame there. And then he put a doll in a chair, over here at **B**, or over here at **D**, or over here at **C** [Pat uses his pointer]. *And he asked the child what the doll would see; how the doll would see it!* And to make matters easier, so to speak, he had a series of photographs that he took from different angles, and he asked the child to identify what the doll saw. *And at a certain stage the child assumed that the doll saw exactly what the child saw, saw it exactly as it appears at the top of the slide.* And then he had some cut-out shapes and he asked the child to kind of move those cut-out shapes so that they would be like silhouettes of the mountains; and he had the cross separate, and the snow separate, and the chalet separate. And the children would go from various stages of being able to organize or not to organize those in a way that a sensible being, sitting in those locations, would be able to do it.

*This is a matter of transformation! So there is the organizing of extensions and durations in relationship to our bodies. And then there is the more complicated problem of organizing other percipient and intelligent beings in our world in relationship to the things that we're observing. And there comes a point where children are able to do this fairly accurately, but it takes an awful lot of these stages of topological organising and topological transforming.*

And one of the things that happens in a topological transformation — if you remember back to the drawing of the triangle inside the circle [model 12 following p. 27 above] — *if you think of transforming in this triangle-circle case as a movement, and as a movement that involves drawing that circle and triangle on a balloon or a piece of stretchable rubber that you can deform it; you can stretch it so that you get something approximating to the drawing that the child had with the interior and the exterior. What that stretching operation does is to transform one perspective into another in a way that doesn't violate continuity.* The continuity would be violated if the rubber sheet got ripped or torn or had a hole in it. Then other kinds of things would happen that are beyond topological transformations!

So what Piaget is suggesting here is that children at some point can keep things next to each other, can keep the things that are in contact with one another in contact with one another, the things that are separated separated. But what they haven't yet been able to do is to transform from one point of view to another in such a way that takes into account the

spatial dimensions, the ‘in front of’ and ‘the behind’ and ‘the next to’, and how they change when we change from orientation to another.

- **Example of map of Boston public transportation system: a topological representation. It displays only continuity and discontinuity (getting on and off, changes) but it nevertheless serves to integrate our bodily orientation into a public frame.**

*So the kinds of intelligences that children are exhibiting, the kinds of insights that they are having as they learn to be able to translate from one point of view to another, is also a matter of insights. And we’re going to see that, for Lonergan, the fundamental feature of the intelligibility of space and time is knowing how to transform from one perspective or reference-frame to another! And that’s what’s involved in public reference frames. Public reference frames are the larger context within which we situate our personal reference frames so that we can transform them one into the other!*

## Topology and Maps

This [the map of the T on the left of the slide] is just an example of how we ourselves are still topological! This is a map of the MBTA system here in Boston.

What are we really interested in when we’re using the public transportation system? We’re not exactly interested in the fine details of the twists and the turns! What we want to know is continuity and discontinuity! Where do I get on? That’s a discontinuity! Where do I get off? That’s a discontinuity! If I have to change lines, where do they intersect? That’s a discontinuity! *Those are the things that we need to know when we’re using the public transportation system!* And we’re using a map like the T map, in order to be able to relate our bodily orientations into a public orientation, namely the system that people cooperate to make the T system work properly!

This [the map of the greater Boston area on the right side of the slide] is actually a map that is a little bit more Euclidean geometrical. And I just want to draw your attention to the Blue Line. So the Blue Line is nice and straight here, isn’t it? [Pat uses his pointer to indicate the Blue Line as depicted on the left hand side of the slide]. This is actually the Blue

Line [pointing to the Blue Line as depicted on the right hand side of the slide]. Or this is not actually the Blue Line: this is a different map representation of the Blue Line, which is much more curvy!!

[Subdued laughter]

Why do we draw a user map using — preserving only the topological features, and not some of the more Euclidean geometrical features? Because, as I said before, we're intersecting with the public reference frames in ways where the only things that matter in those uses are the topological features!

- Questions like “Where am I?”, “What time is it?” and “When did it happen?” are answered differently, depending on whether one asks them in a personal or public reference frame.
- Situated within public reference frame, the question “Where?” implies in relation to an intersubjectively understood and agreed upon Origin.
- Mircea Eliade pointed out that if Space and Time are experienced as completely homogeneous, as lacking any orienting Origin, then they are experienced as a meaningless Chaos.
- In the public reference frame, the Origin points become highly significant for a whole group; they are intersubjectively understood and accepted, perhaps collectively chosen as well.

- They serve as founding moments or points, around which all other extensions and durations are oriented and structured and given meaningfulness in relation to Origins via insights.

### ***Kinds of Space and Time:***

#### **Public Reference Frames**

Where am I? Where are you? Where is it?

When did that happen?

What time is it?

In relation to *what*?

When we ask: “Where am I?” “What time is it?” “When did it happen?” in a Personal Reference Frame, we’re asking the question in relation to what? In relation to my body! In relation to here and now! So not everything in our Personal Reference Frame is here and now, but everything in our Personal Reference Frame is related to here and now!

In a Public Reference Frame, however, we’ve got a different — We’ve got something different.

***Kinds of Space and Time:***  
**Public Reference Frames**

Where am I? Where are you? Where is it?

When did that happen?

What time is it?

In relation to *what*?

*Intersubjectively, insight-structured*  
around “**Origins**” (CWL 3, p. 167).

*In a Public Reference Frame we've got something different. We've got a different sense of **origin**! So it's an intersubjective origin. It's an origin that is intersubjectively understood, and intersubjectively accepted! The acceptance can be tacit; the acceptance can be something we inherit as part of our cultural upbringing. But origins for Public Reference Frames are in some fundamental way agreed upon!! And they are also in some fundamental way intelligible orderings!*

## ***Kinds of Space and Time:***

### **Public Reference Frames**

### **The Problem of Ordering:**

Mircea Eliade: homogeneity is Chaos

“*Origins*” are Sources of Meaningfulness

“*Origins*” are intersubjectively chosen

Insights *structure* other extensions and durations  
as meaningful by relation.

Now Mircea Eliade was a historian of religion, or a historian of comparative religion.<sup>6</sup> He was interested in discovering the commonalities in religious symbolisms, particularly of mythical symbolisms, and symbolisms of space and time. And for him, the fundamental foundational religious phenomenon is that of founding the world. And in relationship to the founded world, the rest of space and time is meaningless. It is chaos!

So Eliade writes this in his book, *The Sacred and the Profane*:<sup>7</sup>

For religious man, space is not homogeneous; he experiences interruptions, breaks in it; some parts of space are qualitatively different from others. “Draw not nigh hither,” says the Lord to Moses; “put off thy shoes from off

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<sup>6</sup> Mircea Eliade (1907–1986) was a Romanian historian of religion, fiction writer, philosopher, and professor at the University of Chicago. He was a leading interpreter of religious experience, who established paradigms in religious studies that persist to this day. His theory that *hierophanies* form the basis of religion, splitting the human experience of reality into sacred and profane space and time, has proved influential. One of his most influential contributions to religious studies was his theory of Eternal Return, which holds that myths and rituals do not simply commemorate hierophanies, but, at least to the minds of the religious, actually participate in them.

<sup>7</sup> Mircea Eliade, *The Sacred and the Profane: the Nature of Religion* (New York: Harper & Row, 1959), pp. 20-21.

thy feet, for the place whereupon thou standest is holy ground!” (Exodus, 3:5). There is, then, a sacred space, and hence a strong, significant space; there are other spaces that are not sacred and so are without structure or consistency, amorphous. Nor is this all. For religious man, this spatial nonhomogeneity finds expression in the experience of an opposition between space that is sacred — the only *real* and *real-ly* (*sic*) existing space — and all other space, the formless expanse surrounding it.<sup>8</sup>

So homogeneity — that which *lacks an origin*, that which doesn’t have any special place that is *the really real place* — he says for religious peoples is just a meaningless chaos!

It must be said at once that the religious experience of the nonhomogeneity of space is a primordial experience, homologizable to a founding of the world. It is not a matter of theoretical speculation, but of a primary religious experience that precedes all reflection on the world. For it is the break effected in space that allows the world to be constituted, because it reveals the fixed point, the central axis for all future orientation. When the sacred manifests itself in any hierophany, there is not only a break in the homogeneity of space; there is also revelation of an absolute reality, opposed to the nonreality of the vast surrounding expanse. The manifestation of the sacred ontologically founds the world. In the homogeneous and infinite expanse, in which no point of reference is possible and hence no *orientation* can be established, the hierophany reveals an absolute fixed point, a centre.<sup>9</sup>

I have a couple of reflections on this. First of all, what he’s saying here is that for — *That a religious people is a group of people*. It’s not for an individual *that* he is talking

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<sup>8</sup> Eliade, *The Sacred and the Profane*, p. 20.

<sup>9</sup> Eliade, *The Sacred and the Profane*, pp. 20-21.

about! He's saying that for a religious people *some place is revealed — in what fashion he goes on to explain in some detail — But some place is revealed as unlike every other place, as sacred ground, as profoundly special. And that that's a shared sense of it as **the place, the origin, the special place.** And the origins themselves then are the sources of the meaningfulness of everything else!* Everything else is then organized in relationship to these fundamental meaningful origins — by insights! People use their insights to construct ways in which other spaces are put into contact with and into a life-giving connection with these profound places and origins of meaningfulness. The origins are intersubjectively chosen or at least intersubjectively acknowledged and accepted. And then insights structure other extensions, other durations, around them. And without some special place, extensions and durations become meaningless, at least meaningless for a group of people.

- Homogeneous space can be symbolized by endless water, as found in several creation myths.
- Contrast this homogeneous space to one with an origin point, such as an island or an oasis. In *Genesis*, the waters are divided and the paradise becomes an Origin point, making orientation possible.
- Pure homogenous space can be seen as a kind of empirical residue.
- Public space requires a publicly meaningful Origin point.

Now, I've got some illustrations of this.

**Blue expanse of water**

So think of “water, water, everywhere,” which is found in many of the myths of origin in various religions. One of the ones of which it is particularly true is the Babylonian Myth. There’s nothing but a great expanse of water! Think of yourself as being in the midst of water, and you don’t know which way is up! All you know is that everywhere you look there is water with nothing to make it other than homogeneous. It just looks the same everywhere! That experience of being under water with everything the same, and no sense of how to get to the surface, is what Eliade is getting at by what he writes about the chaos and the profound threat to meaningfulness that is represented by the experience of having space being homogeneous everywhere!

[A quick series of pictures of sea and sky]

But compare that to what happens when something breaks through and differentiates that homogeneous chaos, that symbolic chaos, into that which is the Paradisal Isle; something differentiates the water into waters below and waters above. So the sky is blue and it is just a big dome, and the other water is gone! That’s actually the first Genesis — the Genesis chapter one story. And you’ve got a Paradise that comes and makes a centre which has meaning, that’s a meaning of profound value and reality, around which everything else is structured, including politics [uncertain word].

[Some laughter]

Or you can take — another set of religious symbolisms to characterize this are the symbols of an oasis appearing in the desert.

<p style="text-align: center;"><b>Expanse of undifferentiated sand</b></p> <p style="text-align: center;">followed quickly by</p> <p style="text-align: center;"><b>Picture of palm trees in an oasis</b></p>
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Just think of the meaningless expanse not knowing where you are and how to get to any place, and then suddenly there’s a point of orientation in what was otherwise a homogeneous expanse.

So durations, particularly when Lonergan was talking about the empirical residue — *The empirical residue is just pure homogeneity of spatiality, with no differentiations whatsoever! In order to have space — in order to have public space, you have to have something that is a publicly meaningful origin, that has some profound meaningfulness associated with it.* Eliade is concerned with the manifestations of origin and meaningfulness specifically in the realm of religion, but it's not the only example.

- There are other kinds of Origins.
- For example, “There’s no place like home.”
- Home is really a group of people, bound to a place laden associations, experiences, memories.
- Public space is often oriented with respect to home.
- People have their own secret places, their neighbourhood, their hang-outs, their alma mater, etc.
- There are places where life-changing events occur: where one meets one’s love, where warriors have fallen, where people were born or passed away. Such events can all make places into origin points.

*So for a lot of us there’s no place like home! A house is not a home! What makes a home is a group of people. And the things that many of us associate with the earliest stages of our lives, moments of celebration, moments of tears and reconciliation, moments of affection, times of fun, times of stupid things happening that people laugh at, times of punishment: all those things are associated with our experiences of home! And there is no place like home!*

## **Other Kinds of Origins**

**“There’s no place like home.”**

**My secret place**

**My neighbourhood**

**Our favourite place/hangout**

***Alma mater* (“Towers on the Heights”)**

**Where I met the love of my life**

**Where the dead have fallen**

Just to give you an example. My Grandmother lived to be I think eighty-four years old. She moved to the United States from Bavaria when she was twenty-three. And when she was eighty years old — so she’d been in the United States sixty-seven years — maybe I’m getting mixed up on it — So she was eighty years old, and she said: “I’m going home!”

The meaningfulness of home, all the memories and rich associations that go along with home, become a place of origin. And in many ways when we’re organizing our public spaces, we’re organizing it in relationship to home.

Where’s that point of origin? It’s home! Or maybe you have a secret place! I still have one!!

[Loud laughter]

That field I used to go out and read in; or the little corner at the back of the house that nobody really thought of. You may organize your space around that!

But what’s more public than your secret place is your neighbourhood! People often have very fond memories of their neighbourhood, because it is in some sense like an extended home! But it’s not just *your* neighbourhood, but it’s *everybody’s* neighbourhood! It’s the neighbourhood of all the neighbours! It’s all the things that you did: playing

stickball,<sup>10</sup> and the skipping-rope, and throwing snowballs, and playing hide-and-peek; and all those kinds of things we did as a child; the friendships that you form, say that I formed with my neighbours that grew out of the things that we did while we were watching our children playing, and so on; the way in which you get into conversations that lead from one thing to another, and you get to know people in a deeper and more profound way. Those are all associated with the neighbourhood. There's no place like the neighbourhood!

You get outside your neighbourhood, and you're sort of in foreign territories! It's a little bit on the order that Eliade characterized, what the space outside of your neighbourhood is like;<sup>11</sup> until you can figure out how to intelligibly relate other neighbourhoods to your neighbourhood. There's all kinds of ways we can do that. We like to do that with liberal education, and getting people to discover what it is that are the common elements of being human that we share with people outside our neighbourhood.

But nevertheless that is an adding of insights over and above, beyond, the sense of origin that goes along with a neighbourhood.

Or our favourite places or hangouts; our *alma mater*. Who knows Latin? *Alma mater* means what? ... It means the mother of my soul!<sup>12</sup> Ah, "the Towers on the heights!" The way in which people form some of the friendships that last their whole lives in the days of their college education! The campus, and the identifying building on the campus like Gasson Hall, become the symbolic centres of those public origins, those spaces that have all those — That rich complex association of meanings are associated with that place; and then everywhere else is related to that place, like the other campuses, the other parts of the city, and so on!

Or where you met the love of your life; it's a special place that is a new beginning!  
Or where the dead have fallen! I am particularly mindful of my experience in visiting the

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<sup>10</sup> Stickball is a street game related to baseball, usually formed as a pick-up game played in large cities in the Northeastern United States, especially New York City and Philadelphia. The equipment consists of a broom handle and a rubber ball, typically a high bouncer or tennis ball. The rules come from baseball and are modified to fit the situation, i.e. manhole covers for bases or buildings for foul lines. This game was widely popular among youths growing up from the 19th century until the 1980s in Boston, Philadelphia, New York City and Northern New Jersey. The game is a variation of stick and ball games dating back to at least the 1750s.

<sup>11</sup> Pat is presumably thinking of some of Eliade's remarks regarding the "other spaces that are not sacred and so are without structure or consistency, amorphous" (*The Sacred and the Profane*, p. 20).

<sup>12</sup> Would not "kind mother" or "nourishing mother" be the literal meaning, even if "mother of my soul" nicely brings out a richer and deeper dimension of the term?

Gettysburg National Memorial. It just is an overwhelming sense of how people lived and died in order that we could be living the lives that we are living today — for better and for worse! But nevertheless, it’s just a profound experience to go there and see all those monuments that have been erected by people from all over the United States, from the North and from the South, to the men who fell there in that battle! And then to remember the stirring words of Abraham Lincoln! So all those meanings gather into that place and make it a place of origin, an origin from which other things get their meaning by intelligible relatedness to that origin.

- When you ask “Where are you?” in a public reference frame, you’re trying to relate your immediate surroundings to other reference frames, to render them meaningful in relation to some public Origin, to their larger context, or to get back to your origin, etc.
- We cannot talk about Space and Time without also talking about origins, claims Lonergan, and these are not arbitrary.

### **Kinds of *Space* and Time:**

#### **Public Reference Frames**

Where am I? Where are you? Where is it?

*Being* lost

In *relation* to what?

“Where” = “in what relation to what origin”

Intersubjectively, insight-structured,  
ordered around “*Origins*”

(*CWL* 3, p. 167).

When you're asked: Where are you? what are you asking in the context of a Public Reference Frame? When you ask: Where are you? you can see the extensions and durations that are in front of you. And you may have them organized in a certain Personal Reference Frame organization that can be actually fairly sophisticated! *But when you say Where am I? what you're asking is how are the experienced extensions and durations related to some public origin.* How do I get back home? What is the intelligible connectedness between where I am and something meaningful, something that will make this set of experiences, this set of extensions meaningful by knowing — having the insights about how they are related to the meaningful origins.

So when we're asking the question Where am I? Where is it? we are always asking: *In relation to!!* Now this is important, because it's — *What Lonergan is building up here is not radically new, but it's a radical departure that he's part of! The idea that we can talk about space and time without also talking about origin is something that Lonergan thinks is nonsense!* Our spaces and times are always organized around some origin. And origins are not arbitrary! Origins are profoundly —

- Student question about whether these relations are common sense insights, and if so, is it the case that any reference frame beyond my personal one is public?

– Yes. In a public reference frame there is the issue of the Origin, and then of the relatedness to that Origin.

Our organization of public Space is largely topological; suffused with meaningful paths and reference points (landmarks). The phenomenon of being lost has to do with an inability to situate yourself with respect to meaningful places and reference frames. The urban architect Kevin Lynch describes being lost: the circumstances, the emotional consequences, etc.

Pat:           Somebody had their hand up.... Greg?

Greg:           Yeah. I guess my question is with respect to the insights that allow us to answer that question, Where am I? Or perhaps even more so, when someone else asks us, Where are you? Would those all be classified as common sense insights?

Pat:           Yes! That, I think, is part of the reason why Lonergan gives them such short shrift! I've gone on at much greater length about those few pages in Chapter Five than Lonergan himself does. And that's because he hasn't yet gotten to common sense. But you're absolutely right. They're all common sense insights that do the relating.

Greg:           Because I guess I'm just thinking when we talk about Public Reference Frames, I guess I think of kind of a larger group. But really any Reference Frame beyond a Subjective Reference Frame would be a Public Reference Frame.

Pat:           Yeh!

Greg:           For example, if Bert calls me on the phone, and I know that it may not be the clearest way to explain it, but the way that he's going to understand it is to reference this building or that building.

Pat:           Exactly! That's exactly right! And it's something I was going to come to in a moment. In other words, what we do when we organize a Public Reference Frame around an origin — *So we've got two issues in a Public Reference Frame, just as we do in any other reference frame. We've got the issue of the origin, and then we've got the issue of the relatedness.* And one of the things that we do when we give people directions — if you give Bert directions to your apartment, what you have to do is say, "Look, go to this monument, then take this path until you get to this monument, then take this path until you get to this monument, this landmark. That's how we organise our space! *And it's largely a topological ordering!!* It's paths disrupted by landmarks that are certain kinds of discontinuities. Now they're not discontinuities in space! It might be perfectly, you know, impenetrable concrete ... What they are discontinuous with is us being on our way! The way that I was along, I now have to change and make a right-hand turn to go on a different way! *So largely our Public Spaces are topological, suffused with all kinds of meaningfulnesses, meaningful origins and meaningful places. And so on!* Good point!

And Kevin Lynch has an interesting thing to say about being lost. Kevin Lynch has this book *The Image of the City*,<sup>13</sup> which is another exploration of the ways in which — although, as we’ll see in a moment, he doesn’t actually use the word ‘insight.’ There’s a bit of an oversight of insight in Lynch’s writing. But nevertheless, *insights* are operative implicitly in what he is talking about. But he says this:

To become completely lost is perhaps a rather rare experience for most people in the modern city. We are supported by the presence of others and by the special way-finding devices: maps, street numbers, route signs, bus placards. But let the mishap of disorientation once occur, and the sense of anxiety and even terror that accompanies it reveals to us how closely it is linked to our sense of balance and well-being. The very word ‘lost’ in our language means much more than simple geographical uncertainty; it carries overtones of utter disaster!<sup>14</sup>

So being lost means not being able to place yourself in relationship to the places of meaningfulness. And not having a way of knowing what the order is! What’s up here? How does this all work?

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<sup>13</sup> Kevin Lynch, *The Image of the City* (Cambridge, MA,: MIT Press, 1960). Kevin Lynch (1918-1984) was an American urban planner and author. His most influential books include *The Image of the City* and *What Time is This Place?* (1972).

<sup>14</sup> Lynch, *The Image of the City*, p. 4.

- Student question of Lonergan's relation to Heidegger.

- Norberg-Schultz was influenced by Heidegger, along with Piaget, and they have played a major role in the class presentation. Lonergan in *Insight* at least was not influenced by Heidegger, but there are similarities in the treatment of Space and Time. Lonergan made his own distinctive contribution, however, particularly regarding the role of insights in our organizing of extensions and durations. Moreover this enables him to deal with the problem of relativism later on.

Pat: Stephanie?

Stephanie: This is sounding awfully Heideggerian to me: the whole meaningfulness of your surroundings, having signage ... Yeah, I think he uses the word 'horizons' maybe, kind of to refer to our orientation within our space. And I'm just wondering if Lonergan — you know, if that's definitely where this is coming from, or —

Pat: It is coming from there — to a certain extent — by way of Norberg-Schultz, who uses Piaget and uses Kevin Lynch and he also uses Heidegger, to think out architectural and cultural spaces. So yeah! There is a lot of that! But there is also already in Lonergan — *What Lonergan is doing is drawing attention to the permeating role of insights in the organization of our extensions and durations. That's his, I think, special contribution to this conversation.* With regard to some of the other things, he would be in fundamental agreement! So yeah, there is some Heideggerian business in there.

But there are a couple of things that are a little different! *One is the importance of insight in this process. And the other is his answer to what seems to be a problem of*

*relativism!* And maybe we'll talk about that a little bit more. So that's the difference: by drawing attention to the intelligibility of the structurings and the role of insights, he can respond to certain problems having to do with relativism!

Stephanie: Thank you.

- Two main issues are associated with public reference frames:
- *What* is the Origin, in relation to which other things are made meaningful?
- *How* other places are related to the Origin?
- Origins must be intersubjectively understood and agreed upon.
- Thus paths and landmarks are required to relate places; they enable these relations.
- The empirical residue (homogenous space) makes it possible for Space to be *publicly* intelligible, mutually understandable, insofar as it is open to hosting a plurality of unique different intelligibilities.
- The homogeneity that Eliade characterizes as Chaos is also the unformed residue out of which can come intelligible organizations that can be understood by a multiplicity of persons.

Now what I want to draw attention to here in this slide ["Kinds of **Space** and Time"] is the following: It's one thing to say "Where am I?" and to answer "I'm this far from home!" or "I'm this far from the sacred place!" or "I'm this far from the neighbourhood!" It's another thing to say 'far'! What does 'far' mean? Or, to put it more broadly, *in*

relationship to. So there are two issues that are involved in Public Reference Frames and in Public Spaces. One is: what's the origin in terms of which other things are given meaningfulness? The other is: how are the other places related to the origin? The 'how' of the relating is the big deal!

## **Kinds of *Space* and Time:**

### **Public Reference Frames**

Where am I? Where are you? Where is it?

*Being lost*

In *relation* to what?

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(*CWL* 3, p. 167).

## **Maps & Directions**

Relating paths & landmarks

Intersubjectively understood (intelligible)

Relating to intersubjectively meaningful *Origins*

Importance of the empirical residue

And Gregory mentioned this: what we do is we relate things, so, for example, to our neighbourhood or to our home by paths and landmarks. The landmarks that we look for where we know we need to make a turn. And in order for this to be a Public Reference Frame, it isn't just **our object** that we use. But it has to be something that we can intersubjectively communicate! So as Greg was saying: it can't just be some idiosyncratic

name like ‘gooing’ that Greg has decided to give to a certain building. And he tells Bert “When you get to gooing you turn right!” [Pat raises his arms in the air]. Bert has no idea of what gooing means!!

[Some laughter]

The landmarks and the paths themselves have to be part of an intersubjective communicable network! And what the paths and the landmarks do is they enable us to locate *this place* to the Origin meaningful place.

And I threw in the little remark about the importance of the empirical residue just to mention it, because it’s such a vacuum/vacuous [adjective unclear] notion. *And why does Lonergan throw it out there? Well, one of the things is: if it weren’t for the empirical residue, it wouldn’t be possible for Greg to have an insight into something and Bert to have an insight into something and have it be the same insights. There has to be something about spatiality and temporality which is open to different intelligibilities; because if the uniqueness of Bert’s spatial extensional experience were all there were, there is no way that Greg could communicate his absolutely unique spatial experience! It’s because, in their spatiality, there’s an openness to an intelligibility which can be invariant across transformations of particularities of space and time, of particular areas of extension and duration, that makes it possible for there to be such a thing as a public reference frame! Okay? So that very radical homogeneity that Eliade characterizes as the Chaos of space makes it possible for there to be intelligible organizations of it. Because it in itself doesn’t have an intelligible organization! And that’s what makes it possible that we can have public organizations where we share the same intelligible organization.*

## Kevin Lynch

### *The image of the City*

“In the process of way-finding, the strategic link is the environmental image [with its associated set of insights], the generalized mental picture of the exterior physical world. ....

“A vivid and integrated physical setting, capable of producing a sharp image [and insights], plays a social role as well. It can furnish the raw materials for the symbols and collective memories of group communication.” (*The Image of the City*, p. 4).

Okay. These are just a couple of remarks from Kevin Lynch as he thinks about cities, and about the public organization of space.

In the process of way-finding, the strategic link is the environmental image, the generalized mental picture of the exterior physical world.<sup>15</sup>

You'll notice in brackets I stuck in: “*with its associated set of insights.*” So Lynch's book is *The **Image** of the City*. And by image, I think if you read it carefully, what you discover is what he means is this fusion of lots of images, and lots of meaningful memories, *and insights*. Because *an image in and of itself is not generalizable! An image in and of itself is what you have in your imagination. That you can connect your image with someone else's image is the key to a public reference frame, and that's what insight makes possible!* And what Lynch is interested in is exploring first of all some of the issues that have to do with the natural terrain that either facilitate or impede the formation of a generally shared intelligible ordering of

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<sup>15</sup> Lynch, *The Image of the City*, p. 4.

places; and some of the things in human behaviours and in human constructions that either facilitate or impede that.

So he says

A vivid and integrated physical setting, capable of producing a sharp image [and insights], plays a social role as well. It can furnish the raw materials for the symbols and collective memories of group communication.<sup>16</sup>

And that is what he's exploring in his works, particularly in this regard to city spaces.

- In *The Image of the City*, Kevin Lynch discusses the way that public images (common mental pictures), held in people's imaginations, help construct a public reference frame.
- But an image as such is not shareable. It is the intelligible connectedness of images that can be publicly shared.
- Lynch discusses the factors that facilitate or impede a generally shared, intelligible reference frame.
- Namely, a vivid and integrated physical setting helps establish public images.
- Those public images are made possible with the help of insights — makes it possible to hold images in common.

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<sup>16</sup> Lynch, *The Image of the City*, p. 4.

- For example, insights contribute to way-finding and remembered routes. The cultural reference frame of Boston is not identical to the actual layout of the city, but is influenced by a publicly shared reference frame, which contains some points of confusion.

## Kevin Lynch

### *The image of the City*

“Public images’ [are] the common mental pictures [and insights] carried by large numbers of a city’s inhabitants: areas of agreement which might be expected to appear in the interaction of .... a common culture. ...

“The world may be organized around a set of focal points, or be broken into named regions, or be linked [through insights and] by *remembered* routes.” (*The Image of the City*, p. 7).

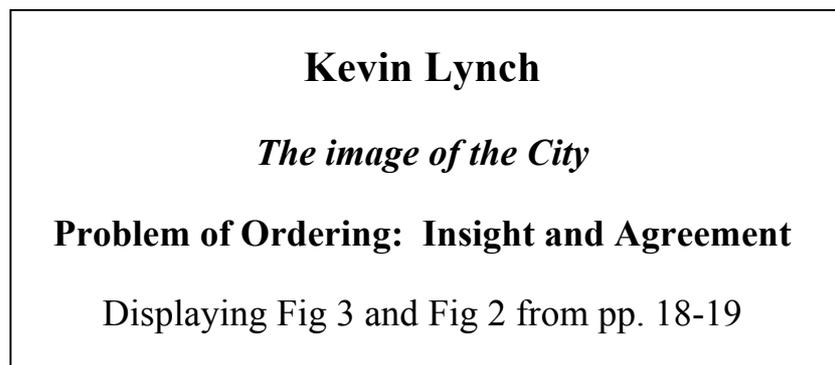
Lynch goes on later as follows: “Public images’ [are] the common mental pictures [with their associated insights] carried by large numbers of a city’s inhabitants.”<sup>17</sup> It’s the insights that make it possible for large numbers of people to carry them. Think about that! In a city, even as small as Boston with about five hundred and fifty thousand people: how many images possessed by one person are shared by all five hundred and forty-nine thousand, nine hundred, and ninety-nine other people. *That’s not what’s shared* — although some of those images may be shared by a few people. *What is shared is a set*, as Lonergan says in

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<sup>17</sup> Lynch, *The Image of the City*, p. 7.

Chapter Six, *a common fund of insights, that make for the possibility of “agreement which might be expected to appear in the interaction of .... a common culture.”*<sup>18</sup> So just going back to that example that Greg was giving us before, the common things that can be easily designated as being along certain ways towards certain destinations are part of what Lynch is getting at here. So:

The world may be organized around a set of focal points, or be broken into named regions, or be linked [through insights and] by *remembered* routes.<sup>19</sup>



Now what Lynch did in his researches is that he looked at different cities. He worked at MIT, so Boston was one of the places he looked at. On the right you see [**outline map of the Boston peninsula**] a schematic map that is more or less Euclideanly accurate to the peninsula of Boston. On the left [**the visual form of Boston as seen in the field**] is what he found by sending his graduate students out to ask people: “How do you get from here to a named different place?” And there were certain places that people could not get to! Perfectly continuous! Notice on the right-hand-side there is no physical discontinuity! *But culturally, the Public Reference Frame of Boston was: “Well you can’t get there from here!”*

[**Some initially hesitant but growingly confident laughter**]

He’s got all kinds of details about the various places, and why this happens; and some of it is just the physical topography, and some of it has to do with the human construction that caused this.

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<sup>18</sup> Lynch, *The Image of the City*, p. 7

<sup>19</sup> Lynch, *The Image of the City*, p. 7.

**Kevin Lynch**

*The image of the City*

**Problem of Ordering: Insight and Agreement**

Displaying Fig 25 from p. 69

And so he's got this little map of the fuzzy boundaries you know, [**variable boundaries of Boston districts**] where places are; whether — Well, you can see that some parts are well-defined and some parts are poorly defined. So if you tell someone: “Well, meet me at **place x**. You have to go through such and such a domain to get there!” There are some confusions in the cultural-social Public Reference Frame that people have about Boston.

Okay! Let's take a break there!

**Insight & Beyond: Lecture 8, Part 2:**  
Chapter 5: “Space and Time”  
October 28, 2009

**Summary of Material**

- Public spaces and Public Reference Frames.
- Spatial/architectural meanings *are* the interrelationships — or as Lonergan puts it, they are the *orderings* of places and times (via insights).
- In *Meaning in Western Architecture*, Christian Norberg-Schultz discusses how architecture conserves and communicates existential meanings.
- Architecture helps structure and make meaningful our experiences of places and times by situating them within a comprehensive meaningful order.
- The character of a place (its *genius loci*) arises from its relationship to more comprehensive order.
- *Perceptual* space varies continuously and from individual to individual.

- But *understanding* gives intelligibility to existential space (*ordering* of extensions of durations) and creates stability and orientation.
  - Settlements are places made meaningful by shared understandings — vs. perceptions that cannot be shared.
  - Different epochs and cultures of architecture each had their own fundamental building tasks, according to Norberg-Schultz.
  - Societies render space meaningful by ordering it in certain ways, particularly in their great public works.
  - For example, Egyptian tombs and temples embody constancy and stasis over time.
- Omnipresence of sun and unchanging world processes (Nile).
- Pyramids are stable forms, situated along the funeral paths. Parallels and perpendiculars of paths reflect the path of the sun and the Nile.
- The medieval gothic cathedral embodied a different building task, that of the pilgrimage, a path towards a transcendent divinity.
  - In Norberg-Schultz's discussion of the settlement around the city, we see how a public reference frame is built up out of insights, that is, how public space is structured around the cathedral, and how different functions in the social life were given their specially structured places.

- There are different kinds of public time as well as of kinds of public space, organized by insights of relationships — experienced durations in relation to especially meaningful times.
- The question of relation to origin holds for time just as it does for space.
- When we ask, “When did that happen?” or “What time is it?”, we're asking “in relation to what?”
- Time is both continuous and discontinuous: the problem of sleep points to discontinuity in our experience.
- We anticipate certain relations upon awaking; we situate ourselves to both our immediate surroundings and to the more abstract ones that give it meaning.
- The ordering of time can be linear or cyclical.
- Different orderings of seasons — indeed different seasons — in different cultures.
- A cyclical sense of time is found in our myths, our experience of the seasons, and our annual celebrations.
- The birth of Christ was seen as the rebirth of time, and linked to the winter solstice (the rebirth of the sun).
- Student observation on life in an island environment without seasons, and the static sense of time.

- Discussion of how natural environmental and climatological differences do set a certain context within which various human meanings of space and time can emerge.
- What if time is ordered as linear, rather than cyclical? Does time deviate from linearity, can it take a crooked path?
- Time is not prestructured and predetermined; we organize it through public reference frames having their own origins and endpoints.
- Western model of time is linear, marked by deadlines and speed. But where are we headed?
- Finally, Lonergan deals extensively with Special Reference Frames.
- There is a distinction between the concrete and the abstract intelligibility of space.
- This can lead us to ask whether cultural, public space is the ‘real space’, or is Absolute Space, the space of physics, the real space.
- Scientific, physical space does not represent the only ‘true’ intelligibility of space and time.
- Reality of cultural spaces depends in part on the authenticity of the peoples who constitute those spaces.
- What is the correct intelligibility of the actual physical space and time — an open question.

- Special reference frames are a departure from both personal and public spaces.
- Under the aegis of the “Canon of Complete Explanation” — scientifically ordered, and are based upon an explanatory approach to space and time.
- Problem of how to order extensions and explanations that do not privilege any particular origin or particular observer.
- We ask, “Where is *everything*?” or “when did *everything* happen?”
- Problem of special reference frames is how to organize around some origin — without privileging any particular one.
- Lonergan identified a certain problem that is peculiar to physics.
- Science takes an explanatory approach to space and time: they are structured abstractly, where this means in relation to one another = abstract intelligibility of Space and Time.
- How are extensions and durations related to one another, not just to me?
- Similarly, physics aims to give an explanatory account of motion, that is, to set forth its classical correlations among the parts of that motion.
- Yet physics faces the problem of seeking an explanatory understanding of motion, if motion is always relative to an observer?

- Newton tried to avoid this issue by assuming the existence of a time, space, and motion that were all absolute, rather than relative.
- Relative time measured according to some specially chosen motion (e.g., of sun, seasons, etc.).
- Einstein was dissatisfied with the Newtonian explanation of space and time.
- In particular, he objected to the fact that different equations existed for the same phenomenon of light propagation; either the Biot-Savart Law or Faraday's Law were applied, depending on the circumstances.
- Einstein sought correlations that were invariant (technically, co-variant) despite changing or transforming of reference frames.
- Special reference frames and explanations of motions require naming every point.
- A Cartesian coordinate system that can assign a name to every possible point.
- What happens when we change from one reference frame to another, i.e. from one origin to another? Explanatory classical correlations cannot change their form when we change origins.

- How can we be sure that we can order every space by the Cartesian grid?
- The invariance of classical correlations means that these correlations are unaffected by a change in origins.
- How do classical reference frames relate to one another in the context of seeking classical invariant correlations?
- How do we know we can order every point by means of a Cartesian grid?
- It's not clear that we can organize spaces in that way.
- Geometrical considerations not only allow us to draw a grid but also to talk about how we translate from one reference frame to another.
- Inversely, knowing how things transform will tell us what kind of geometry we actually have.
- Einstein insisted that classical correlations are invariant, and that changing your origins should not have any effect on the invariant layer.
- He claimed that the transformations being used were wrong, because they assumed that space and time were independent.
- Space and time are actually interdependent.
- A thought experiment: measuring the length of a moving bus is difficult because the spatial measures would have to be taken simultaneously.

- Yet simultaneity is not absolute; but dependent on one's state of motion.
- We assume that a certain understanding of Space and Time is not only the true but the only possible one.
- The absolute is not resident in absolute space and time.
- Newton's absolute space privileges a certain reference frame. Einstein removes this privileged frame.
- The proper relatedness of space and time is required to explain certain physical events.

## Insight & Beyond: Lecture 8, Part 2: Chapter 5: “Space and Time”

- **Public spaces and Public Reference Frames.**
  - Spatial/architectural meanings *are* the interrelationships — or as Lonergan puts it, they are the *orderings* of places and times (via insights).
  - In *Meaning in Western Architecture*, Christian Norberg-Schultz discusses how architecture conserves and communicates existential meanings.
  - Architecture helps structure and make meaningful our experiences of places and times by situating them within a comprehensive meaningful order.
  - The character of a place (its *genus loci*) arises from its relationship to more comprehensive order.
  - *Perceptual* space varies continuously and from individual to individual.
  - But *understanding* gives intelligibility to existential space (*ordering* of extensions of durations) and creates stability and orientation.
  - Settlements are places made meaningful by shared understandings — vs. perceptions that cannot be shared.

We'll continue just a little bit more on public spaces and public reference frames, before I make the transition. This is from Christian Norberg-Schulz, whom I referred to earlier.

## **Christian Norberg-Schulz**

### ***Meaning in Western Architecture***

“By what means, then does man gain the [existential] foothold and identity which are not offered him by nature? In general, he succeeds because of his ability to reach beyond the individual situation, that is, because of his ability to abstract and generalize....This implies that the meaning of any phenomenon is the context in which it appears, and that any man *is* the interrelationships or meanings which are accessible to him.” (*Meaning in Western Architecture*, p. 428, italics original).

And he writes the following:

By what means, then [do human beings] gain the [existential] foothold and identity which are not offered ... by nature? In general, [we] succeed because of our ability to reach beyond the individual situation, that is, because of our ability to abstract and generalize.<sup>20</sup>

So where Lynch is relying on the language of images and pictures, here Norberg-Schulz is clearly identifying that there is some other dimension of human mentality, human consciousness, that is involved in the making meaningful of where we are to answer the question “Where are we?”

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<sup>20</sup> Christian Norberg-Schulz, *Meaning in Western Architecture* (London: Studio Vista, 1975) p. 428.

This implies that the *meaning* of any phenomenon *is the context* in which it appears, and that any [person] *is* the interrelationships or meanings which are accessible to him or her.<sup>21</sup>

*So I want to emphasize here that, again, space and time are interrelationships. The meaning is the interrelatedness: how a particularity, a particular moment, a particular location, a particular occurrence, is related in a context of relationships; and that context of relationships is what he understands by meaningfulness.*

## **Christian Norberg-Schulz**

### ***Meaning in Western Architecture***

“The purpose of the work of art is to conserve and communicate experienced existential meanings. ... A man experiences an act of identification which gives his individual existence meaning by *relating* it to a complex of natural and human dimensions. ... Orientation implies that any meaning is experienced as forming part of a comprehensive spatio-temporal order .... The character of the place is determined by this revelation .... *Any* place, in fact, contains *directions* and *openings*.” (Norberg-Schulz, *Meaning in Western Architecture*, pp. 429-431, emphases original).

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<sup>21</sup> Norberg-Schulz, *Meaning in Western Architecture*, p. 428.

And he goes on to talk about architecture: “The purpose of the work of [architecture] is to conserve and communicate experienced existential meanings.”<sup>22</sup> *You could say that it is concerned to communicate origins and the context of relationships that puts those origins in relationships to other extensions and durations. The passage continues: “giving individual existence meaning by relating it to a complex of natural and human dimensions ... Orientation” —<sup>23</sup> So being lost means not only not knowing where I am, but not knowing which way to turn, which path to take, which orientation is it that will relate me to that which is meaningful. “Orientation implies that any meaning is experienced as forming part of a comprehensive spatio-temporal order.”<sup>24</sup>*

Then he has this phrase: “The character of the place.”<sup>25</sup> The book that he wrote after *The Meaning in Western Architecture* was *Genius Loci*, the spirit of a place, the character of a place. Places have certain characters. A place can seem chaotic and confusing and scary and frightening and dishevelled! Or it can seem harmonious and peaceful and beautiful and attractive. What is the character of a place? “The character of a place is determined by this revelation.”<sup>26</sup> *Which is to say the revelation of this place as being related to a comprehensive and meaningful order, an order of relatedness. And the order itself is meaningful, first of all because it has places of meaningfulness as origins, and it has a way of organizing, a way of relating, that is also a meaningful way of organizing and relating. And therefore “any place contains directions and openings.”<sup>27</sup> Any place always already has a directionality to it, and has openings, openings to other places, other times, other opportunities, other possibilities!*

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<sup>22</sup> Norberg-Schulz, *Meaning in Western Architecture*, p. 429.

<sup>23</sup> Norberg-Schulz, *Meaning in Western Architecture*, p. 429.

<sup>24</sup> Norberg-Schulz, *Meaning in Western Architecture*, pp. 429-430.

<sup>25</sup> Norberg-Schulz, *Meaning in Western Architecture*, p. 430.

<sup>26</sup> Norberg-Schulz, *Meaning in Western Architecture*, pp. 429-430.

<sup>27</sup> Norberg-Schulz, *Meaning in Western Architecture*, pp. 429-430, emphases added.

## Christian Norberg-Schulz

### *Meaning in Western Architecture*

“Whereas perceptual space varies continuously, existential space has a relatively stable structure!

*(Meaning in Western Architecture, p. 430).*

Complex, interrelations of:

Centers (nodes)

Paths

Regions or domains (enclosures)

Landscapes

Settlements (villages, towns, cities)

Neighbourhoods

Building (homes, churches, palaces)

Bedroom, kitchen, hearth

And Norberg-Schulz goes on to look at different developments of the organizing of existential space, making the observation that I drew attention to in a different context a little bit earlier: “*Perceptual space varies continuously.*”<sup>28</sup> *Among other things, it varies from individual to individual. You don’t rely, nor could you rely, on somebody seeing and hearing and touching with the exact same experiences that you see, hear, and touch. But what you can rely on is their capacity **to understand** the same, even though there are differences, empirically residual differences, in their experiencing. And that’s what gives existential*

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<sup>28</sup> Norberg-Schulz, *Meaning in Western Architecture*, p. 430, italics added.

*space a relatively stable structure! “Existential space has a relatively stable structure!”<sup>29</sup> So it’s not perceptual space that’s stable. Perceptual space is chaotic and ever changing! It’s the intelligible ordering, the ordering of extensions and durations, that makes space relatively stable, and gives it the capacity, he says, that human beings need for a sense of knowing where they are, what is the meaningfulness of where they stand, and the time that they stand in!*

And he goes on to talk about the complex interrelations among *centres*, or if you like, *origins*; and *paths*, that originate from those *nodes* or *origins*; and *that* then intersect one another to form other *nodes*, *origins* or *landmarks*. And then mainly he looks at *regions* and *domains*, or if you like, *enclosures*: how *paths* form *enclosures*, and the *enclosures* define something like that notion that we saw in Eliade, that this is a space that has meaning; this is *My village*, this is *My town*, this is *My city*; or this is *Our village*, this is *Our town*, this is *Our city*. *This is meaningful to us. This is where we live together, where we do the project of meaningfully living together.* And within the *settlements* and *neighbourhoods*, and within the *neighbourhoods* the buildings, and especially buildings like our homes and our churches and our governmental institutions, all of which are made to be meaningful places within this comprehending meaningful way of ordering that is characteristic of the *neighbourhood* and the *settlement* and the *landscape*. And within buildings, he draws attention to the very significance of the bedroom, where reproduction and love take place; and the kitchen where nourishment and care take place. And the hearth, where people dwell with one another.

He has extensive explorations of all these different places. And how the bedroom, in one kind of cultural setting is different than it is in another kind of cultural setting. And how the hearth has a different meaning in one kind of cultural setting, or if you like, public reference frame, than it has in another.

And there is a lot of rich material there which I’m not going to go into! **What I’ve done** is just to broaden out this notion of a public reference frame.

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<sup>29</sup> Norberg-Schulz, *Meaning in Western Architecture*, p. 430, italics added.

## Picture of Pyramids in the Egyptian desert.

- Different epochs and cultures of architecture each had their own fundamental building tasks, according to Norberg-Schultz.
- Societies render space meaningful by ordering it in certain ways, particularly in their great public works.
  - For example, Egyptian tombs and temples embody constancy and stasis over time.
  - Omnipresence of sun and unchanging world processes (Nile).
  - Pyramids are stable forms, situated along the funeral paths. Parallels and perpendiculars of paths reflect the path of the sun and the Nile.

So in *Meaning in Western Architecture*, Norberg-Schulz goes through a number of different periods. And the first period that he treats is Egyptian. And then he goes on to talk about Greek architecture, Roman architecture, Romanesque architecture, Gothic architecture, and Baroque architecture; twentieth-century architecture — which he looks for a way to characterize, and he uses the term ‘pluralistic.’ He identifies some of the difficulties with the architecture after about nineteen-twenty or so!

*So he traces the different epochs of architecture, and he situates them in relationship to what he says is the society’s or the culture’s fundamental building tasks. And a fundamental building task is the fundamental task of making space meaningful by ordering it in certain kinds of ways. Now, I’ll just give you a couple of examples of this. There’s a difference in the fundamental building task of Ancient Egypt; the fundamental building task*

of Ancient Egypt was the building of tombs and temples, and especially tombs! And the fundamental building task for the twentieth century is office buildings. And the fundamental building task of the medieval period was cathedrals! *So he's really on to something very significant here! He asks, or when you now ask, what's the most important public work in a society, you're getting at what is the way in which the society publicly orders — what kind of public reference frame — what kind of — It's not just what are the origins that are meaningful, but **how** are things integrated into a meaningful order that is characteristic of a particular culture, which is to say, a public reference frame.*

And so I just want to read to you just a little bit of what he says about his interpretation at least of the architecture and the culture of Egypt.

The basic task of Egyptian culture was to protect the experienced and desired totality against change! Change is a function of time, and hence the necessity of interpreting time as an eternal rhythm within a basically static order. This rhythm is made visible as orthogonally ordered spatial extension —<sup>30</sup>

He does a lot on why it is that the pyramids are square-based, rather than triangular based, which as is easily proved has a lot to do with this orthogonal — I'll show you more of what he has in mind when he is emphasizing that.

— [It's a spatial extension that is] neither infinite nor finite. It does not break all bonds as did Baroque extension later, nor does it lead to any final goal.<sup>31</sup> —

— as the cathedrals do in the Gothic period.

Instead it leads symbolically to the world beyond death, where life is reborn in Osiris.

The way the Egyptians organized space, therefore, was a realistic but highly imaginative interpretation in spatial terms of

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<sup>30</sup> Norberg-Schulz, *Meaning in Western Architecture*, p. 42.

<sup>31</sup> Norberg-Schulz, *Meaning in Western Architecture*, p. 42.

the basic existential facts of their world. Egyptian man was forever immobile and eternally on his way.<sup>32</sup>

*So — Norberg-Schulz's interpretation of Egyptian architecture is an architecture that represents and mirrors back absolute stability, unchanging-ness. And it has to do with features that are derived from the environment, including the eternal recurrence of the Sun rising and setting. There's not a lot of variation in the seasons in Egypt, as there is in Northern European and Southern nations. There is just a constancy of the seasons, and the constancy of the eternal presence of the Sun, constancy of the flowing of the river, of the Nile, which happens to flow, in this case diagonally, to this path of the Sun. And so you get that dia-crossing pattern [Pat makes the crossing image with his hands] that is the basis of this orthogonal — Those of course — He has all kinds of marvellous insights into the meaning of the pyramids: among other things, what we see now of course is not the way they appeared when they were brand new. They were polished, and they reflected the Sun in dazzling brilliance, to reflect back to the people the eternal omnipresence of the Sun, and the unchanging-ness of the global order!*

### **[Map of Egypt, showing the Nile broadly and in detail]**

Norberg-Schulz also draws attention to the fact that the pyramids were built along the Nile, to form, as it were, a human-made parallel to the mountain ranges, the mountains themselves being eternal and unchanging — at least until you study Geology!

[Some amusement]

And he draws attention to the fact that the paths that were the funeral paths to the temples and to the pyramids ran either completely parallel to the Nile or perpendicular to the Nile, which is to say that they travel to the path of the Sun. *So that the paths were deliberately reflecting the eternal order.* This [the picture on the right hand side lower-middle of the display] is just a picture of one of the paths from the Nile towards one of the temples. And here [scale model on bottom right-hand side of the display], in theory, you can see that the paths are always moving in an orthogonal way, just as the Sun moves orthogonally relative to the path of the Nile.

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<sup>32</sup> Norberg-Schulz, *Meaning in Western Architecture*, p. 42.

I'm just giving a snippet of his analysis which is very rich and very insightful about all sorts of things about Egyptian architecture and Egyptian culture. And how the fundamental building paths and the fundamental story of Egyptian culture are reflected in the way in which they construct the pyramids in relationship to these other elements. He gives you this way in which the ordering, the way in which the public spaces are ordered together.

**Slide displaying two views of Gothic Architecture**

- The medieval gothic cathedral embodied a different building task, that of the pilgrimage, a path towards a transcendent divinity.
- In Norberg-Schultz's discussion of the settlement around the city, we see how a public reference frame is built up out of insights, that is, how public space is structured around the cathedral, and how different functions in the social life were given their specially structured places.

This is the cathedral in Rouen. It's a very different kind of fundamental building task. And among the things that happen in a cathedral that don't happen in the Egyptian context is that *the cathedral is organized round a pilgrimage. The fundamental thing in a cathedral is a path! And it's a path that's on the way, and it's on the way towards the transcendent, which is overwhelmingly emphasized by the spires and by the elevated interiors, and so on!*

**Slide displaying Gothic Church Spire in relationship to a town.**

Norberg-Schulz has some very interesting other things to say about the cathedral and its place in the medieval culture.

As the character of the medieval habitat may be understood as an extension of the character previously encountered in the church interior, —

So he's talking about the Romanesque predecessor —

— it implies a new relationship between the church and its surroundings.<sup>33</sup>

That's why I have that picture there situating a cathedral in relationship to a town.

Whereas the exterior of the Early Christian church was a continuous, enclosing envelope, and the Romanesque church a stronghold, in the Gothic church optical or symbolic dematerialization is replaced by a real dissolution of the wall and it becomes transparent and interacts with the environment. The building is a diaphanous skeleton whose mass is ideally reduced to a network of abstract lines. Fully developed the medieval church no longer appears as a refuge, but communicates with a larger whole, and functions as the centre of a meaningful, spatial organism. It has been said that the Gothic cathedral was built “in spite of the stone,” an observation which testifies to the fact that it represented an existential image rather than being an answer to mere practical problems.<sup>34</sup>

And then he goes on to say this:

Although they appear irregular and picturesque, the settlements of the later Middle Ages are based on symbolic principles of organization. —

So the way in which the extensions are organized —

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<sup>33</sup> Norberg-Schulz, *Meaning in Western Architecture*, p. 185.

<sup>34</sup> Norberg-Schulz, *Meaning in Western Architecture*, p. 187.

— Regardless of size, they had basic properties in common: enclosure, density, intimacy, and functional differentiation. This last aspect consisted, for instance, in the specialization of streets and quarters [domains, neighbourhoods] for certain purposes, such as types of handicraft. The squares were also specialized in larger settlements. Of particular significance was the city wall which offered the necessary protection to make the town function as a “container,” as well as a “magnet,” to use Lewis Mumford’s words. Thus, the town became a place where a true communal life could develop; in other words, the brotherhood of the monastery was extended to a more comprehensive social unit. In general, the medieval town resembles a living organism, where the wall is the hard shell and the church the delicate core.<sup>35</sup>

*So that just gives you some further ways of thinking about this business of a public reference frame that involves insights to organize around meaningful events, places, experiences, and so on.*

- There are different kinds of public time as well as of kinds of public space, organized by insights of relationships — experienced durations in relation to especially meaningful times.
- The question of relation to origin holds for time just as it does for space.
- When we ask, “When did that happen?” or “What time is it?”, we're asking “in relation to what?”

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<sup>35</sup> Norberg-Schulz, *Meaning in Western Architecture*, p. 187.

- Time is both continuous and discontinuous: the problem of sleep points to discontinuity in our experience.
- We anticipate certain relations upon awaking; we situate ourselves to both our immediate surroundings and to the more abstract ones that give it meaning.

### **Kinds of Space and Time:**

#### **Public Reference Frames**

When did that happen?

What time is it?

In relation to what?

“When” = “in what relation to what origin”

*Intersubjectively, insight-structured  
around “Origins” (CWL 3, p. 167)*

*So I just want to say something, a little more briefly, about time, public time. When we ask: “When did it happen?” “What times is it?” again we’re asking a question about “In relation to what?” and “In what relation to what origin?” So just as the organization of public space is a publicly shared set or inventory of insights that relate particular immediate concrete locations to meaningful, especially meaningful publicly accepted places, that’s also true of time. When we ask “What time is it?” we’re always asking “in relation to what?”*

Now *there is a tendency to think that time is just this continuous phenomenon!* It has those qualities that are so much like the ones that Eliade talked about. *But the problem is we fall asleep and we wake up!*

And I want to tell you a little anecdote about something that happened to me. I was ice-skating one day and I fell, and I hit my head, and I blacked out! I assume that if you black out you don't know you blacked out! But then I started to come to, and the first thing that came to me was: "Why have I 'go-to-sleep' eyes?"

[Laughter]

### **Kind of Temporal Public Orderings**

**Continuous/discontinuous:**

**the problem of sleep**

**Cyclical**

**Linear**

**Straight line, curved line, crooked line?**

**What is the origin? What is the end?**

Where's my blanket?

[Increased laughter]

I was putting myself — I was putting the concrete experience of time that I was having into an intelligible frame that was the wrong intelligible frame. I didn't have a lot of previous experiences of knocking myself out! So I just started — I just pushed the start-button, and I went into the wake-up mode! And what are we doing when we're waking up? We're putting the experiences of duration that we are experiencing as we start to wake up in relation to things. We start to think "Okay, I don't want to get up! Oh, God, I've got to do this today!" or "Oh, God, I get to do this today!"

*So we start to put our immediate experiences in relationship to the things that we're anticipating. And that's an act of intelligence!! Husserl talks about 'pro-tension,' and there's a lot that goes on there. But what Lonergan wants to emphasize is the activity of insight that's involved in this!*

*We are also situating ourselves with regard to things that happened the day before. "Oh God, I forget to pick up the trench (!)!! I can't have that cereal today because I would need fruit to put on it; or I need milk!" So you see that as you start to wake up, you're starting to put the immediate durations that you're experiencing as you're experiencing them in relationship to other durations that are not present to you. And it's only in so far as you do that that you make the immediate experiences meaningful! Otherwise you say, "What day is it?" "What year is it?" "Where am I?" But now 'where' means "where am I in time"! So one of the things that we are doing personally is putting our memory together. But people do that temporally also!*

- The ordering of time can be linear or cyclical.
- Different orderings of seasons — indeed different seasons — in different cultures.
- A cyclical sense of time is found in our myths, our experience of the seasons, and our annual celebrations.
- The birth of Christ was seen as the rebirth of time, and linked to the winter solstice (the rebirth of the sun).

*And the question of what kinds of orderings of time are there? And we tend to think of time as a linear flow. But the most fundamental and primordial experience of the ordering of durations is not linear, but cyclical! And we order our lives to a large extent around the seasons. And in the Northern Hemisphere and in North America we tend to order around four seasons. But what you get normally is three seasons. There's the season of heat, the season of rain, and the season of growth. Those are the ways in which durations are*

meaningfully ordered, around three seasons and not four. The Egyptian pattern is the constant recurrence of the path of the Sun.

In most cultures, there are changes of seasons, but they go through a cycle and repeat *that cycle* over three hundred and sixty-five or so days. And that becomes the fundamental way of organizing time. The date — *Most myths, most religious stories about time and origins are all cyclical!* The reason that we celebrate New Years, and the reason that some cultures celebrate things like the winter solstice, or the harvest festivals, are because *quite literally the cycle dies and is reborn! Time dies and it is reborn.*

And stop and think about it if you don't — If you haven't studied physics or astronomy, or something. It's always sort of a miracle that the Sun doesn't keep dying. The days get shorter and shorter and shorter; but then they stop getting shorter, and they get longer and longer and longer! That is an amazing thing; it's something to celebrate! It's a moment in time that is shared by everybody, and people have a lot of deep feelings about times associated with it. And in terms of that, they make it meaningful.

Christians celebrate Christmas on December 25<sup>th</sup> because they had bad calendars! **[Some amusement]** It used to be the first day of the Roman calendar. When Christmas was celebrated, it was put on December 25<sup>th</sup> — It wasn't just Christians that had a bad calendar, the Romans did too! Christmas was put on December 25<sup>th</sup> because that was *believed to be* the winter solstice. *So the Christians saw in the birth of Christ that very profound beginning in time that people who celebrated the cosmological times associated with the rebirth of the year, the rebirth of the world, the winter solstice.* The problem was that the calendar kept moving around; it was supposed to be January the first; and then it was supposed to be December 25<sup>th</sup>; and now it is somewhere around December 21<sup>st</sup>. But originally, the Christian holiday was celebrated, not by a date found by somebody standing around in Bethlehem, and saying: "Oh, yeah, that's the date it happened!" *It was celebrated when it was because it was associated with the beginning of time. That could then be that in relationship to which all time became meaningful!*

And not surprisingly, non-Christians don't start their years at that time, because they've got other especially meaningful events, like the flight from Mecca to Medina, and those kinds of things that make especially meaningful all the times that flow after!

- Student observation on life in an island environment without seasons, and the static sense of time.
- Discussion of how natural environmental and climatological differences do set a certain context within which various human meanings of space and time can emerge.

Somebody over here had a question?

Mary: No. I was just raising my hand, because I was just going to make a comment on: I spent a year in Hawaii, and just while we were there, I think one of my biggest problems was I felt that the lack of the seasons or change or anything was a sheer reflection on the society and culture: when like there is no perception of time, like meaning, being changed. It's kind of like you're just stopped in a timeless paradise and environment — I think it's true of a lot of island cultures; and like they take life at a much slower pace, and they don't give as much importance to, you know, an environment like the east coast, you know where they are constantly going, going, going. And you know, the next thing is coming, and so that kind of gives you the motivation and some sort of belief in progress.

Pat: There's a lot — Certainly those are differences — The pure ecological, climatological differences set a context that Lynch and Norberg-Schultz both say set a context within which human beings can further develop or distort their meaningful organizations of space and time. And so, yeah, I'm not surprised to hear that that would be very different. Sure!

- What if time is ordered as linear, rather than cyclical? Does time deviate from linearity, can it take a crooked path?
- Time is not prestructured and predetermined; we organize it through public reference frames having their own origins and endpoints.
- Western model of time is linear, marked by deadlines and speed. But where are we headed?

So our fundamental and most primordial organization of time is cyclical! But if it's linear — Stop and think about what that means! If it's linear, unlike — In the case of a circle which has no natural, so to speak, beginning or end, you have to impose an origin into it! You have to disrupt in some way something that's special, that's different from the rest of the circle.

On the other hand, *a line, by definition, has a beginning and an end*, except for an infinite line. But — *so if you're not thinking of an infinite line, it has a beginning and it has an end!* And so one of the things that you are talking about when you're talking about time — this discontinuous experience of duration, you have a discontinuous experience of duration every single day! Your continuous world of time is disrupted every time you fall asleep! And you have to put them together in some fashion. *And whether that fashion is cyclical or whether it's linear, that is a matter of using your insights to organize your time!*

Is the line a straight line? Is it a curved line? Is it a crooked line? A curved line is the line when you've got a job with great deadlines. There are some really intense times, and then there are some slow times. And then there are some really intense time and then there is some slow time. Time can be curvy for all kinds of different reasons and ways according to the public reference frame that you inherit and make meaningful for your personal experiences of durations. Is it a crooked line? Does it set off in one direction and then deviate, and then deviate back? Is a culture a crooked line? Did the United States execute a crooked line with the Civil War? Was the United States on a temporal trajectory that changed in a dramatic way at the Civil War? Or at any other point in our history?

*This is just giving you some ways of thinking about the fact that time doesn't come to us as an absolutely imperative, prestructured organization of durations!* The way in which times are organized depends to a large extent on the public reference frame that's doing the organizing! And what is the origin? What is the end?

Norberg-Schulz explains that the pathway that's built into the architecture of a Catholic Cathedral, the pathway is a pathway to God, which is symbolized by the dramatic transcendent opening over the altar in the church.

The United States, and modern western culture in general, is linear time. We're in a big hurry, as Mary just indicated! We're especially in a big hurry in the North-East compared to some other parts of the United States! Where are we heading? ... The medieval Christians were pretty clear on where they were headed! We're all in a big hurry; we're on a linear path, and where are we headed? The answer to that is in some senses embedded in the way in which we do our rationale.

So this is just some ways of thinking about — parallel to what we looked at in terms of the public reference frames that we draw upon to organize our extensions and durations; how we think about it in terms of the organizing of time.

- Finally, Lonergan deals extensively with Special Reference Frames.
- There is a distinction between the concrete and the abstract intelligibility of space.
  - This can lead us to ask whether cultural, public space is the 'real space', or is Absolute Space, the space of physics the real space.
- Scientific, physical space does not represent the only 'true' intelligibility of space and time.

- Reality of cultural spaces depends in part on the authenticity of the peoples who constitute those spaces.
- What is the correct intelligibility of the actual physical space and time — an open question.

**Kinds of Space and Time:**

Special reference Frames

Where is everything?

When did everything happen?

What time is in, for whom?

**Scientific Orderings**

(Explanatory & Abstract Ordering of Extensions & Durations)

“A problem Peculiar to Physics” (p. 167)

*So at last we come to Special Reference Frames, which is the bulk of the Chapter, but which is not going to be the bulk of today’s class: because I think it’s — It’s important to see what Lonergan is up to by seeing that he has intentionally left out, or turned space into some abstraction. As I said last week, and again at the beginning of today’s class, there’s a distinction in Lonergan between the “Abstract Intelligibility of Space and Time” and the “Concrete Intelligibility of Space and Time.”*

{ **Abstract Intelligibility of Space and Time**  
 { **Concrete Intelligibility of Space and Time**

And what I’ve spent most of today’s class talking about is the “Concrete Intelligibility of Space and Time:” *the intelligibilities of Space and Time that are made concrete especially by the ways in which people live together and constitute their living together by the way that they organize their patterns of experience.*

*But that said, the organizing is itself  
something that is a function of insight.*

And somebody asked me at the break — I think Greg before he left — “Aren’t these cultural spaces — they’re not the real spaces, are they?” And the answer to that is: Well, it depends! And it depends on how authentic the people are who are responsible for constituting those spaces. Just as people can live fake lives, a collective can live a fake space and a fake time. So the answer to whether or not they’re real depends a great deal on the authenticity and the character of the people who are doing the constituting of those public spaces.

That said, what’s in the background — what Greg was really asking about — is something like, “*Well, is it absolute space, the real space? Or, if you like, isn’t the physics space the real space?*” *Well, it’s part of the real space! But the distinction between the abstract intelligibility of physical space and the concrete intelligibility of physical space is an important thing to keep both parts of that equation in mind!*

*Most of the argument in Chapter Five is about the abstract intelligibility of space and time, and why it’s an open question! That’s the most important thing! The intelligibility of physical space and time is an open question! And it is not the total intelligibility of space and time, because as Lonergan says, every geometry has to be interpreted through some origin! And so the concrete intelligibility of space and time is the abstract intelligibility of space and time as it organizes and relates all the concrete origins!*

- Special reference frames are a departure from both personal and public spaces.
- Under the aegis of the “Canon of Complete Explanation” — scientifically ordered, and are based upon an explanatory approach to space and time.
- Problem of how to order extensions and explanations that do not privilege any particular origin or particular observer.
- We ask, “Where is *everything*?” or “when did *everything* happen?”
- Problem of special reference frames is how to organize around some origin — without privileging any particular one.

So let’s take a look at this: The special reference frames make a departure from either the personal or the public reference frames, and that they are under the orientation of what Lonergan called back in Chapter Three, “**the Canon of Complete Explanation**” (CWL 3, pp. 107-109). *The Canon of Complete Explanation* says, in effect, *no questions are off limits! That everything has to be intellectually interrogated! But the special focus of that section is the privileging of space and time in certain ways!* And so he’s coming back to that here, saying that *special reference frames have to do with the explanatory approach to space and time*. So it’s no longer for whom, but everything, every extension, every duration, every possible interrelatedness, is what is of the concern of the Special Reference Frames. It’s a scientific ordering, an explanatory ordering, of extensions and durations.

And that means there is a problem with privileging either one’s own body, or one’s own culture, or one’s own group. And *so the problem of Special Reference Frames is the problem of how do you organize space and time around an origin but in a way that doesn’t privilege any particular extension, duration, individual experience, or culture.*

- Lonergan identified a certain problem that is peculiar to physics.
- Science takes an explanatory approach to space and time: they are structured abstractly, where this means in relation to one another = abstract intelligibility of Space and Time.
- How are extensions and durations related to one another, not just to me?
- Similarly, physics aims to give an explanatory account of motion, that is, to set forth its classical correlations among the parts of that motion.
- Yet physics faces the problem of seeking an explanatory understanding of motion, if motion is always relative to an observer?
- Newton tried to avoid this issue by assuming the existence of a time, space, and motion that were all absolute, rather than relative.

Relative time measured according to some specially chosen motion (e.g., of sun, seasons, etc.)

## **Kinds of Space and Time:**

### **“A Problem Peculiar to Physics”**

“since all mathematical principles and all natural laws of the classical type are abstract, it follows that their appropriate expression must be invariant.” (CWL 3, p. 165).

“However, the science of physics does not enjoy the same immunity. It investigates local movements, and it cannot state their laws without some reference to places and times.” (CWL 3, p. 165).

*And so Lonergan articulates the problem that he says is peculiar to physics as the problem that physics, like the other sciences, is looking for classical insights; and the classical insights are abstract, abstract in that particular sense that we explored over a couple of weeks, that means that all classical correlations are conditioned. They are not — they do not determine the conditions under which they operate; they are subject to the conditions under which they operate that are given from someplace else; and so the intelligibility of classical correlations is intelligibility that is not in relationship to me! Its **descriptive** relationships are how are things — in this case, how are extensions, how are durations — related to me. **Explanatory** is concerned with how are the extensions and durations related to one another without any restrictions whatsoever! So that’s the concern in the explanatory approach to space and time.*

And in particular, physics, since it is at its origin with Galileo — we saw this a little bit a couple of weeks ago — is concerned with motion; it’s concerned with giving an explanatory account of motion; it’s concerned with understanding how the parts of the motion of an object relate to the other parts of the motion of that object, how the motion of

that object relates to the motions of other objects. *There's a peculiar problem for physics to come at classical correlations that explain and underpin physical motion because motion is always relative to something! So how can you even think about **explaining** motion when motion seems to be by definition relative to something?*

## **Newton's Presuppositions about Space, Time, and Motion**

“1. Absolute, true, and mathematical time, in and of itself and of its own nature, without reference to anything external, flows uniformly and by another name is called duration.

Relative, apparent, and common time is any sensible and external measure (precise or imprecise) of duration by means of motion; such a measure for example, an hour, a day, a month, a year — is commonly used instead of true time.”

Now, there was a definite — There was an attempt to dodge this problem, and it was by Newton. He inherited certain tendencies that were already set in play by Galileo, but Newton is the one who certainly articulated this. And I just want to go through this a little bit — talk about it, and then see why he did this. So in his *Principia Mathematica*, at the very beginning, is a long piece called the “General Scholium;” and *it is the area in which Newton sets out the fundamental presuppositions that his science needs.*<sup>36</sup> *If these are not true, then his science doesn't work!*

And *the first one has to do with absolute time.* Probably many of you are familiar with these remarks. [Newton writes as follows:](#)

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<sup>36</sup> See via the internet: “*Stanford Encyclopedia of Philosophy*,” entry on “Newton’s *Philosophiae Naturalis Principia Mathematica*.”

1. Absolute, true, and mathematical time, in and of itself and of its own nature, without reference to anything external, flows uniformly and by another name is called duration.

Notice that is different from the way Lonergan is using the word ‘duration.’ This is pure duration, apart from everything else.

Newton goes on:

Relative, apparent, and common time is any sensible and external measure (precise or imprecise) of duration by means of motion; such a measure for example, an hour, a day, a month, a year — is commonly used instead of true time.

So just think for a moment what [Newton](#) is getting at here. What he is saying is that we — that when we answer the question “what time is it?” we look at our watches and we say: “It’s almost time for class to end: It’s almost seven o’clock!” So we give a number, a seven. But what is the seven doing? The ‘seven’ is a numbering of motions in relationship to some original event!

Now, we measure in what we now call *the common era*; there’s a point in time: it’s usually the time that is associated with the birth of Christ. So that’s the origin in time. And we number the days since then. **[Some inaudible words]**. We break it into years. But *we measure the motions of the sun around the heavens to number how we are related to that moment of origin!* The motions — I still have — I may be the only person in the class who still has a watch with minutes and second hands; it’s a quite an individual watch. We number the motions, the number of movements of the second-hand around the dial, in relationship to the motion of the sun through the skies, in relationship to the revolutions of the earth around the sun, the number of years since that great founding moment.

That's what Newton is getting at, is that ordinarily when we think of time, we just think of time as the number of motions since the event X, that founding moment.<sup>37</sup> That's not true time! True time is just this endless flowing along without reference to anything else, without reference to a sun, without reference to a watch, without even reference to a river. Don't think that this is a river flowing, flowing, and flowing on forever! It's just pure *durée*, pure flow. That's true time!

Newton continues as follows:

### **Newton's Presuppositions about Space, Time, and Motion**

"2. Absolute space, of its own nature without reference to anything external, always remains homogeneous and immovable.

Relative space is any movable measure or dimension or measure of this absolute space; such a measure or dimension is determined by our senses from the situation of the space with respect to bodies and is popularly used for immovable space, as in the case of space under the earth or in the air or in the heavens ...."

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<sup>37</sup> Pat said "founding motion" at this point, and I wonder if this was a verbal slip for "founding moment."

True space is like that. As Newton continues:

“2. Absolute space, of its own nature without reference to anything external, always remains homogeneous and immovable.

Relative space is any movable measure or dimension or measure of this absolute space; such a measure or dimension is determined by our senses from the situation of the space with respect to bodies and is popularly used for immovable space, as in the case of space under the earth or in the air or in the heavens ....”

So this room is a space. It's immovable! Did anybody notice this space moving? It's an immovable space! But that of course is just an illusion, because it's whirring around at about thirty thousand miles an hour because it's attached to the earth, which is rotating. So this is — we're not even in the same space — We're not even in the same space —

[Loud class laughter for some reason]

We're whirring through absolute space, but we treat it as though it were absolute space.

And then he has something similar to say about absolute motion.

## **Newton's Presuppositions about Space, Time, and Motion**

“4. Absolute motion is the change of position of a body from one absolute place to another;

Relative motion is change of position from one relative place to another. Thus, in a ship under sail, the relative place of a body is that region of the ship in which the body happens to be or that part of the whole interior of the ship which the body fills and which accordingly moves along with the ship.

And relative rest is the continuance of the body in that same region of the ship or same part of its interior. But true rest is the continuance of a body in the same part of that unmoving space in which the ship itself, along with its interior and all its contents, is moving ....”

So **absolute motion** is the change in place in absolute space. **Relative motion** is the motion as it appears, as I am walking back and forth in front of the class here, I am moving relative to you. But that's not my absolute motion, because my absolute motion to the motion of me walking back and forth has to be added to the motion of the rotation of the earth, the earth around the sun, the sun around the galactic centre, the galactic centre around its globular centre, and so on! So there are always multiple motions; and what looks like my absolute motion really isn't my absolute motion.

*So that's how Newton attempted to answer that question of an explanatory account of space and time. And there was something I was going to say there?! .... Okay!*

- Einstein was dissatisfied with the Newtonian explanation of space and time.
- In particular, he objected to the fact that different equations existed for the same phenomenon of light propagation; either the Biot-Savart Law or Faraday's Law were applied, depending on the circumstances.
- Einstein sought correlations that were invariant (technically, co-variant) despite changing or transforming of reference frames.

*But Einstein in particular raised the question about this, and he said that there is something wrong with this notion of space and time. Why? ... He started out as a young man dissatisfied with the fact that two equations were different equations for one and the same thing. What's called the Biot-Savart Law: I only have the mathematics up there on the overhead display just so you can see that they are not the same characters. And that was important.*

## ***Kinds of Space and Time:***

### **Special Reference Frames**

#### **Einstein's dissatisfaction**

Biot-Savart Law  $F = q v \times B$

Faraday's Law  $\nabla \times F = \nabla \times qE = -q/c \delta B/\delta t$

Law of Propagation of Light:

$$\delta^2 A/\delta x^2 - (i/c^2) \delta^2 A/\delta t^2 = 0$$

$$(1 - v^2/c^2) \delta^2 A/\delta x^2 + 2((1 + v/c) \delta^2 A/\delta x \delta t - [(1 - c^2/c^2) \delta^2 A/\delta t^2] = 0$$

*Remember a minute ago, Lonergan saying that for an explanatory classical correlation, they ought to have the same form of expression no matter who is doing the expressing. Otherwise, you are recording something that is particular to your sensations, and it's not part of the intelligibility that is grasped by the classical investigator.*

The Biot-Savart Law says that  $q$  is an electron,  $B$  is a magnetic force, and if  $q$  is moving at velocity  $v$  through magnetic force  $B$ , a certain force will be exerted upon it. If you shoot an electron into a magnetic force it will do this: [Pat makes a sudden gesture of extending his right arm out to his right!]. However, if you take a wire and move a magnet past it, where does that electron go? [question not very clear]. According to Faraday's Law, a certain field will be induced in the wire, according to that second expression in the display.

And Einstein said: what is the difference whether you move the electron through a stationary magnetic field, or you move the magnetic field past a stationary electron? It shouldn't make any difference at all! *It only makes a difference if there's really an absolute space!* Right down below on the display is another variation of that. The first equation is how light ought to propagate if you're standing still in absolute space. And the second is how

an odd property if you're running along through absolute space [some unclear words]. You shouldn't get a different law!

Einstein said: *Well, then, those can't be the right laws! If they vary, they are not classical intelligibility. You've imported something of our personal perspective in, if those laws are going to change depending on who is doing the observing!* Oddly enough, what he discovered was that some of the laws, namely the one about the propagation of light — The first one is the right answer no matter who is doing the moving. So if you think you are stationary and you think Tim is moving, you and he should still get the same classical correlation for light. And if that is the case, what Newton thought about absolute space and absolute time turn out to be wrong!

- Special reference frames and explanations of motions require naming every point.
- A Cartesian coordinate system that can assign a name to every possible point.
  - What happens when we change from one reference frame to another, i.e. from one origin to another? Explanatory classical correlations cannot change their form when we change origins.
- How can we be sure that we can order every space by the Cartesian grid?
- The invariance of classical correlations means that these correlations are unaffected by a change in origins.
  - How do classical reference frames relate to one another in the context of seeking classical invariant correlations?

## Un-labelled Cartesian coordinate grid

I'm going to skip [quickly] over this: a special reference frame has to deal with the problem that if you're doing an explanation of motions, and you want to be able to talk about all motions, you need to have a name for every place that there is. And so we draw what we call a Cartesian coordinate system and we give every place a name by giving it two numbers. Now the two numbers exhaust all the places that there are. And that's what he [Loneragan] means by a "special reference frame." And the chief thing is to figure out what happens when you change from one reference frame to another.

[Pat now indicates places on the display with his electronic pointer].

If you move from this origin to this origin, how does the name of that place change? Which is to say how do the numbers assigned to it change?

The insistence that the classical correlations be invariant means that if you change your origins — a change which can be profoundly meaningful for a person, or for a group, or a tribe or a nation — nevertheless, the classical correlations that we are seeking are going to be classical correlations that don't change! That doesn't mean that people's intelligibilities of their own cultural spaces and times don't change, but it refers to something more comprehensive, or if you like more underlying, that is invariant.

And so the discussion of the special reference frames is a discussion about: *how do reference frames relate to one another in the context of seeking the classical invariant correlations.*

- How do we know we can order every point by means of a Cartesian grid?
- It's not clear that we can organize spaces in that way.
- Geometrical considerations not only allow us to draw a grid but also to talk about how we translate from one reference frame to another.
- Inversely, knowing how things transform will tell us what kind of geometry we actually have.

### **Galilean coordinate transformation**

## **Einstein on Space and Time**

*What is it about Einstein's insight into space and time that strikes us as so strange and alien? This stems from an inverse insight underlying uniform motion, but is more fundamentally a matter of intellectual conversion, away from Space and Time as already-out-there-now-real (body-grounded, as fundamentally known as related to our senses) to intelligible relations, and intelligible relations lack that bodily sense of reality.*

When I referred to that little diagram with the two frames of reference, the two special frames of reference, I said that if you draw perpendicular axes through some origin, you can then name everything by associating numbers with it. Concretely, what that means is that

you construct a series of parallel and perpendicular lines that form a grid in terms of which you can do that, assign numbers. How do you know you can actually do that?

Student: The origin, the math.

Pat: I'm sorry?

Student: Because you had an origin — You'd have to go — you'd have to measure everything based on the origin.

Pat: An origin is just a point!! Remember an origin is just a point. In addition to an origin we have to have an ordering. How do you know that you can order every place, or if you like, every extension and every duration, by that expedient, by that method?

### **Abstract Intelligibility:**

#### **Transformation & Geometries**

**From geometrical considerations it will be possible to find three equations relating  $x$ ,  $y$ , and  $z$ , respectively, to  $x'$ ,  $y'$ , and  $z'$ , and further, to show that these equations hold for any point  $(x, y, z)$ . In this fashion there are obtained transformation equations, and by the simple process of substitution any statement in terms of  $x$ ,  $y$ ,  $z$  can be transformed into a statement in terms of  $x'$ ,  $y'$ ,  $z'$ . (CWL 3, p. 169).**

Student: Insight [not uttered with confidence, and generating some tittering].

Pat: That's quite right!

[Laughter]

Pat: It's an insight, and it's an oversight of insight! ... *You don't know that you can do that!* I just told you you could do that, and you understood what I meant! *In fact, it is not clear that you can actually do that, in every space, in every possible space!* *Spaces may not be organisable along a Cartesian coordinate system!* So what Lonergan says here on the display slide from *CWL 3*, p. 169 is that:

From geometrical considerations it's possible not only to draw a grid, but to talk about how we translate from one reference frame to another; from geometrical considerations, we can figure out how to organize a space with a special numerical reference frame, and also how to translate our descriptions in our reference frame, our measurements and our reference frame, to those of another.

### **Abstract Intelligibility:**

#### **Transformation & Geometries**

**In the foregoing consideration of transformations, the procedure in the special case was based upon geometrical considerations. It is worth noting that the inverse procedure is possible, that is, that from a consideration of transformations one can work out the general theory of geometries. (*CWL 3*, p. 169).**

But the inverse is also true! If we know how things transform, that will tell us what our geometrical considerations ought to have been. Or in other words, that will tell us what kind of a geometry we actually have!

- Einstein insisted that classical correlations are invariant, and that changing your origins should not have any effect on the invariant layer.
- He claimed that the transformations being used were wrong, because they assumed that space and time were independent.
- Space and time are actually interdependent.

Now what Einstein discovered was that we were using the wrong transformations. We're using transformations that assumed, among other things, that space and time were independent of each other! Which it turns out, they're not!!

- A thought experiment: measuring the length of a moving bus is difficult because the spatial measures would have to be taken simultaneously.
- Yet simultaneity is not absolute; but dependent on one's state of motion.
- We assume that a certain understanding of Space and Time is not only the true but the only possible one.
- The absolute is not resident in absolute space and time.
- Newton's absolute space privileges a certain reference frame. Einstein removes this privileged frame.
- The proper relatedness of space and time is required to explain certain physical events.

To give a simple illustration, suppose I assign you the task of measuring the length of a moving bus. And suppose you take the obvious example, putting the measuring-stick on a stake at the rear of the bus, and then you walk to the front of the bus. You might never get the task done, unless you're very fast! In which case, you'll get a very wrong answer for the length of the bus! Why? Because the spatial measurements have to also be done at particular times! *You have to figure out whether or not the front of the bus and the back of the bus were at those places simultaneously. And so the use of time enters into your measurement. But it turns out that simultaneity is not absolute!! Simultaneity depends upon your state of motion.*

Ah, I skipped over the slide where — I'll talk about that — I'll do that in the beginning of your class next Wednesday. But the basic point that Lonergan is making here is that when we move into the area of explanatory space and time, of special reference frames, we have the oversight, which Newton did, of assuming that a certain insight about the ordering and the structuring of extensions and durations is not only the true one, but the only possible one, the necessary one. And as Lonergan says, the abstract formulation of space and time will be some kind of a geometry, but what kind is open for investigation.

### **Abstract Intelligibility:**

#### **Transformation & Geometries**

**The abstract formulation of the intelligibility immanent in Space and in Time will be ... a geometry.**

**The expression of the principles and laws of any geometry will be invariant. For principles and laws are independent of particular places and times, and so their proper expression cannot vary with variations of spatiotemporal standpoints. (CWL 3, pp. 173-174).**

And Lonergan says likewise that Galileo and Newton and Kant looked for the absolute, but they looked for it in the wrong place! *The absolute is not resident in absolute space and time. Newton needed absolute space and he needed absolute time.* Otherwise

$$F = ma$$

is wrong, as a classical invariant correlation. We saw ‘ratio’ [word uncertain] means deviation from velocity. If you get on a merry-go-round and you try to throw a ball to somebody on the other side of the merry-go-round — you will see them, they will look like they’re fixed relative to you — you throw the ball in a curve. What force was operating on that ball? What Newton would say is: there was no force operating on that ball; that was a fictitious effect because you were actually moving relative to absolute space.

But the minute we take away the notion that any reference frame is privileged over any other — which is what Einstein does — then Newton’s law of motion fails, because there has to be something that’s responsible for that curving path. *And that something that is responsible can only be comprehended by understanding a proper geometry, the proper relatedness of space and time.*

*So that’s the fundamental point that Lonergan is getting at in this chapter. It’s an attempt to get around the variety of ways in which the disorienting, disconcerting consequences of relativity theory have puzzled philosophers; and to put it in the account of space and time as being intelligibly ordered and discovered by our search for insights.* Okay?

I’ll go back and finish up the part about special relativity. And we will talk about chapter six next time. So please for next time read all of chapter six, including the section on “**The Dramatic Pattern of Experience**” and “**Dramatic Bias.**” And I’ll have your papers for you next week.

End of Class