Insight & Beyond

Class 3, Part 1: September 23rd 2009

"Definitions."

Summary of Material on Chapter 1 §2

Introduction to Lecture 3 (covering the end of Ch. 1 and beginning of Ch. 2)

Self-appropriation and the Question of the Whole: of Being, Truth, Goodness; importance of 'heuristics'.

§2 'Definition' in Chapter 1, "*Elements*": Why definition is addressed.

Definitions & Concepts as emerging in a context of activities, not a vacuum.

Self-appropriation includes becoming aware of how we form our concepts.

Insights are often inter-relationships and require a number of terms to be expressed.

This is Lonergan's solution to the problem of primitive terms.

Not all insights presuppose other insights.

Three kinds of definitions, reviewed.

Nominal definitions: based on how terms are used in actual context. Wittgenstein's performative sense.

- Descriptive definitions: ordinary descriptions of things as they relate to us, especially in sensible ways.
- Explanatory/implicit definitions: deal with things as related amongst themselves.

An exercise in self-appropriating the process of defining: Insects

- What is it? What does it ‘look like’ to me?
- Descriptive defining in terms of sensible traits: illustrations.

Lonergan’s critique of conceptualism.

- Conceptualism as obscuring insight.

What is conceptualism?

- Priority of inquiry and insight: changes how we approach reality of non-sensible.
- Conceptualism and how it evolved. Insights expressed in concepts.
- Why Lonergan starts with mathematical insights.

Lonergan proposes a shift to explanatory definition.

- Another exercise in self-appropriating the process of explanatory defining: Geometrical figure.

Descriptive versus explanatory defining.

- Science is often said to impoverish experience through abstractions.
- Yet Lonergan speaks of an “enriching abstraction” that adds to our experience.

Continuation of the defining exercise.

Explanatory defining is in relation to other things.

Lonergan does not privilege explanatory or scientific insights. Descriptive and nominal definitions involve different kinds of insights.

Science is about relating, about adding intelligibility to experience.

The explanatory definitions of science transcend our own interests and concerns.

Student question regarding the relationships of imagining, understanding, and explanatory defining.

Mathematicians can imagine without having to eventually return to sensations. Scientists use sensations and imagination, but must ultimately return to sensations. In neither case can thinking and understanding be bound by sense or imagination.

Student question regarding going from the general to the particular, the conceptualist approach, the role of inquiry.

Insights of application to concrete situation are needed. This is not a mechanical process, but a creative and subtle one.

Student question on whether Lonergan agreed with the conceptualist definition of abstraction.

No. Arriving at concepts requires insights. In conceptualism, the process of arriving at concepts is not accounted for.

Student question as to whether mental disorders may be due to a disruption of the process of insight.

Mental illness is indeed a blockage of insight; see Chapter 6.

Student question as to whether empirical definitions are always in a state of conceptual flux, subject to revision.

Not exactly; incorrect concepts are revised, by means of corrective insights. Examples from biology.

Student question on role of imagining and images in definition.

The role of inquiry in guiding imagining toward understanding and defining.

Another exercise in self-appropriating explanatory defining: Conic sections.

Student question about exposure to universals and whether definitions can be wrong.

There is so much to be understood about any actual image or entity, that no one concept or definition exhausts all of its intelligibility.

Further illustrations of explanatory definition as relating things to each another.

Insight & Beyond:

Lecture 3, Part 1:

"Definitions"

23rd September 2009

Introduction to Lecture 3

(covering the end of Ch. 1 and beginning of Ch. 2)

Self-appropriation and the Question of the Whole: of Being, Truth, Goodness, importance of 'heuristics'.

§2 'Definition' in Chapter 1, "Elements": Why definition is addressed.

Okay. So we talked a little bit last time about self-appropriation and Lonergan's method, and the implications that this has. We spoke also about how *he sees self-appropriation as a way of approaching the question of the whole, the whole of being, the whole of goodness, the whole of truth, the whole of unity, but doing it in such a way as those remain open questions, and yet nevertheless, questions that we can say some things about without saying everything about* them. That's kind of the key to Lonergan's notion of self-appropriation. *It gives us a way into those issues, but it doesn't in and of itself settle all of those issues*. Now the key word for Lonergan is '**heuristic**', and we will talk about that a little bit at the end of our session today.

[The contents of Chapter One are displayed on the screen]

We began talking a bit about definition, but it was rather rushed at the end, and I said that I thought there was something very important in why Lonergan put such emphasis on definition in this first chapter on 'Elements', though it is rather difficult to follow some of what he is doing! So I'm going to try to spell that out today.

In fact, as I was preparing the class for today, it's very likely we're going to spend most of the class finishing up chapter one, and take up a little bit of chapter two at the end of class, and then carry over chapter two into our next class. That will give me an opportunity to get some reflection questions to you, as I promised and didn't manage to do.

And I also mentioned that I think there is something odd in the order in which Lonergan wrote *Insight*, and I'm going to treat the order slightly differently than he did, and explain why!

So we're going to work our way through some of these very difficult concepts, and I'm going to stop and pause where you folks have questions. And hopefully this material is still somewhat fresh in your minds, and the questions that you had from preparing for last class are still fresh in your minds.

So to repeat something — And I said that we would do an exercise in self-appropriation at the beginning of class. Ah, we're going to do the exercise in self-appropriation that I promised, but we're not going to do it quite at the beginning, because some of the material needs to be spelled out and slowed down, and explained a little bit more.

Definitions & Concepts as emerging in a context of activities, not a vacuum.

Self-appropriation includes becoming aware of how we form our concepts.

§ 2 Definitions and Concepts

Definitions do not occur in a private vacuum of their own. They emerge in solidarity with experiences, images, questions, and insights. It is true enough that every definition involves several terms, but it is also true that no insight can be expressed by a single term, and it is not true that every insight presupposes previous insights. (*CWL* 3, p. 36).

So the first thing is that in terms of this project of self-appropriation, there's this sentence, which as is often the case in Lonergan's writing, a sentence that's sitting there which has a lot of implications but he just moves on and doesn't stop and dwell on it. I want to dwell on it a little bit. "**Definitions do not occur in a private vacuum of their own.**" (*CWL* 3, p. 36). *Importantly, concepts do not occur in a private vacuum of their own. Self-appropriation means taking as one's own the very fact that we are formers of concepts. That it is an activity that we engage in. And it has some rather significant implications. So, as he says here, concepts and definitions are situated within a much richer flow of activities.*

Okay. So at this point, the kinds of concepts Lonergan is talking about are not particularly personal, so the definitions that he talks about, which are largely mathematical, the types of definitions in the first chapter, hopefully as we discuss those, people will feel free to ask me openly about those. But as we get into some other aspects of the self-appropriation process, if you find that you would like to excise that, please let me know and we'll take care of that at the end of the class, if that's okay.

Insights are often inter-relationships and require a number of terms to be expressed.

This is Lonergan's solution to the problem of primitive terms.

Not all insights presuppose other insights.

Now, importantly here in this remark about definitions is that *no insight is going to be expressed by a single term. So there is this interconnectedness of terms and concepts that's required.* Insights overwhelmingly, not exclusively but overwhelmingly, insights are into relationships, and because they are into relationships, it takes a number of terms or, if you like, a number of concepts to be able to express them. And we saw last week, that Lonergan thinks of this as the solution to this problem of primitive terms, namely that if you define one term in terms of the others, and the others in terms of others until you form a circle, that's seems like a vicious circle. As Lonergan says, *it's not a vicious circle, because the nexus or the circle or the network of terms is grounded by an insight. And it doesn't follow that just because terms all presuppose other terms, that all insights presuppose other insights. Many insights* *presuppose previous insights, but there are such things as basic insights, most of which we acquire in the earliest stages of our infancy*. Okay.

Three kinds of definitions reviewed. Nominal definitions: based on how terms are used in actual context. Wittgenstein's performative sense.

Now I briefly, at the end of our last session, talked about the three kinds of definitions that Lonergan cites, one of which he introduces rather later on, and I think it is important for us actually to dwell on today. You encountered it in chapter two for this week, under that subheading of 'classification and correlation' (*CWL* 3, pp. 61-62). So he has introduced one of those distinctions already in chapter two. It's something he returns to over and over again, but for reasons that I don't think I completely understand, he didn't include it in the first section on definitions in chapter one. But in some senses it's the most important thing for us to pay attention to.

3 Kinds of Definitions and Concepts

Nominal: "**Both nominal and explanatory definitions suppose insights**." (*CWL* 3, p. 36).

"**Nominal definitions merely tell us about the correct usage of names**. (*CWL* 3, p. 35).

We talked last week about nominal definitions. Nominal definitions are the definitions that have to do with how to use terms, and I gave you the humorous example of me not knowing how to use 'texting', and other things.

And I asked you to reflect this past week on any examples that you had of nominal definitions, reflections that you had on the insights that you had about how to use terms. Does anybody want to share one of those? … Mike?

Mike: I have an interesting one, because I teach vocabulary. And one of the vocabularies is 'moot', which unbeknownst to me despite using the term for many, many years, means 'debatable'. And when you think of the way most people use the word 'moot', they'll say: "Oh, well, it's a moot point!" *And it dawned on me — and I use it that way too — that the word 'moot' doesn't really mean that. It's the sense that we use in a moot court. So I've been using 'moot' incorrectly for thirty years, I suppose.*

[Some laughter]

Pat: And I join you in that! I —

Mike: It was a shocking revelation, you know! When you say "It's a moot point!" I guess by definition, you're saying it's a debatable point. Most people use it to mean the exact opposite. They mean let's not debate it any more, let's move on!

Pat: Okay. And so what did Michael just do at the end there? So the dictionary definition, presumably the World Wide Web definition of 'moot' is 'debatable', which I'm afraid I didn't know before now either.

MOOT – adjective

1. open to discussion or debate; debatable; doubtful: *a moot point.*
2. of little or no practical value or meaning; purely academic.
3. *Chiefly Law*: *not* actual; theoretical; hypothetical.

But what did Michael just do at the end? … Jeff?

Jeff: It seems like we were almost using it correctly in a common sense way even if it's maybe wrong the other way. I guess it's been redefined within our way of using it.

Pat: Exactly! Exactly. So we have a shared set of insights about how to use the word 'moot'. We just shared the fact that we're all wrong!

[Laughter]

From some viewpoint these insights may be wrong, but we share them. And that happens any number of times in the history of language, where a word gets an accepted nominal definition that's different from what it originally was. And from one point of view there is nothing wrong with that. It is how the community uses the word, and we understand that!

I'll give you another humorous example. When my oldest daughter was very, very little, we were driving along. And I used to read her own stories at bedtime. And reading was a big deal! And so we're driving along; we're driving down a road which many of you perhaps are not familiar with. A few of you are familiar with it. It's called 'The Jamaica Way'.

[Amusement]

There's a road in Philadelphia that's called the Schuylkill Parkway, which the locals call the 'Surekill Parkway'!! The closest you get to the Surekill Parkway in Massachusetts is the Jamaica Way. It's a relatively narrow road for a four-lane highway which it is, and it's very curvy, and it's very poorly lit with a lot of trees and everything. So I'm driving down the Jamaica Way, and my daughter says to me: "Daddy, read me a story!" So: "I can't read you a story now, I've got to pay attention to the road!" [More emphatically:] "Read me a story!" "I really can't read you a story because —" [Most emphatically:] "Well, read it through your teeth!"

How was she using the word 'read'? …

Student: Tell!

Pat: Tell! So the word that we would say, "Oh, what you mean is 'tell!', she hadn't quite yet learned some of the finer nuances to the nominal definition of 'read'. So 'read' means: have a piece of paper in front of you with words written on it, and you're looking at it while you are articulating … She didn't know that! All she knew was that it came out of my teeth!

[Laughter]

So those are examples of nominal definitions. And as I mentioned, Ludwig Wittgenstein effected a real transformation in philosophy, and analytic philosophy, by undermining a different kind of idea of defining language usage and language meaning, by recognizing the pervasiveness and the significance of nominal definitions, performative definitions, performative meanings.

3 Kinds of Definitions and Concepts

Nominal: "Both nominal and explanatory definitions suppose insights." (*CWL* 3, p. 36).

"Nominal definitions merely tell us about the correct usage of names. (*CWL* 3, p. 35).

Descriptive (Commonsense): "There exists, then, a determinate field or domain of ordinary description. Its defining or formal viewpoint is the thing as related to us, as it enters into the concerns of [humans]." (*CWL* 3, p. 317).

There are the similarities of things in their [sensible] relations to us. Thus, they may be similar in color or shape, similar in the sounds they emit, similar in taste or odor, similar in the tactile qualities of the hot and cold, wet and dry, heavy and light, rough and smooth, hard and soft. (*CWL* 3, p. 61).

Okay. *The second kind of definition is actually another very common kind of definition; and Lonergan throws in this notion of description and the descriptive meaning of terms*, although a bit later on. But it's terribly important because it's the main kind, more so than even the nominal definitions. And so as he says, *there is a field of what he calls ordinary descriptions*. Some of you are familiar with analytic philosophy: there's a big field of analytic philosophy that has to do with what are called definite descriptions. That names — *whether or not names can be translated into definite descriptions*. And if you have enough of a description of something so that you uniquely identify it, just the way your personal name should uniquely identify you. *So the domain of ordinary description*! So descriptions in that sense are a kind of definition. "The word means …" and that phrase is followed by a description.

Now, what exactly goes on in describing? *Lonergan is pointing out that what goes on in describing is that we describe things as they are related to us, as they enter into our concerns. And in particular, we describe things according to their sensible relations to us, their colour or shape, their similarity in sound, in taste, in odor, in tactile qualities. So we tend to define things by drawing upon sense qualities*. A chair in this room is a shiny grey-black plastic thing with shiny metal legs and a not so shiny brownish-green writing desk. That's what chairs in Room 253 are like! That's how we could define them.

Descriptive definitions: ordinary descriptions of things as they relate to us, especially in sensible ways.
Explanatory/implicit definitions: deal with things as related amongst themselves.

And *the third kind of definition that he is going to refer to here is the explanatory or implicit definitions. He says that an implicit definition is an explanatory definition without any nominal contents*.

And *there is a significant shift from description to explanation. And it has to do with whether or not we're focusing on the defining process as things related to us, as they appear to us, what they look like, what they sound like, what they smell like, what they feel like, and in particular those appearances as they're structured and underpinned by our interests and concerns*. So if we ask, not about a chair, but a seat: defining a seat is defined in terms of whatever will meet my interests or concerns of sitting down. It doesn't have to have four legs, it doesn't have to three legs. It can be a rock ledge, it can be a stone, it can be a table top, it can be a counter-top, and so on. So we can describe things as they relate to us in their sensible qualities in so far as those sensible qualities fulfill the standards that are determined by our interests and our needs and our concerns. Now, we're going to come back to that!

Three kinds of Definitions and Concepts

Nominal: "Both nominal and explanatory definitions suppose insights." (*CWL* 3, p. 36).

"Nominal definitions merely tell us about the correct usage of names." (*CWL* 3, p. 35).

Descriptive (Commonsense): "There exists, then, a determinate field or domain of ordinary description. Its defining or formal viewpoint is the thing as related to us, as it enters into the concerns of [humans]." (*CWL* 3, p. 317).

"There are the similarities of things in their [sensible] relations to us. Thus, they may be similar in color or shape, similar in the sounds they emit, similar in taste or odor, similar in the tactile qualities of the hot and cold, wet and dry, heavy and light, rough and smooth, hard and soft." (*CWL* 3, p. 61).

Explanatory (Implicit): "Explanation deals with the same things as related among themselves." (*CWL* 3, p. 316).

Lonergan defers discussion of common sense as a human phenomenon until chapter six. But he's already depending upon some familiarity with how we do the selecting of the sensible qualities that we are going to use to characterize things, to define things; that we're going to use — that we're going to be making the selection of the sensible qualities based on our interests and concerns, without yet having called those interests and concerns into question; which is what starts to happen in an explicit way when we get to chapter six. But for the first five chapters he is laying the groundwork upon which we can call those interests and concerns into question.

An exercise in self-appropriating the process of defining: Insects

What is it? What does it 'look like' to me?

Descriptive defining in terms of sensible traits: illustrations.

So those are the three kinds of defining, the three kinds of concepts that go along with those! We've talked sufficiently now about nominal definitions. I want to move on to the second kind of definition. Okay.

So what is this?

[This picture does not correspond exactly to the one Pat uses]

Student: It looks like a moth!

[Short pause, then Pat shrugs and smiles!]

Pat: I tried real hard to find a moth that would look like a butterfly!

[Laughter]

I was hoping somebody would say "It's a butterfly!"

Student: That was the first thing that came to mind, and then I said, "Wait a minute! That looks like a moth!"

Pat: Okay. So if someone answers the question "What is it?" and the answer is, "It's a butterfly!"; and I say, "Why is it that?", the answer would be "Because it looks like a butterfly!" In this case, it looks like a moth!

[Laughter]

It's definitely — Why did you change your mind and say: "It looks like a moth!"?

Student: The shape of the wings does not look like a butterfly's wings. That kind of triangular shape of the wings made me think it was a moth. But firstly, I did think it was a butterfly!

Pat: There actually are butterflies with wings that are roughly similar to that. But *we're talking sensible similarities here. What it looks like! How* *it appears to my senses*! … Did anybody know the giveaway why this is a moth? … Bert?

Bert: Because of the — I can't remember what those hairs are called —

[Pat uses the pointer]

Pat: You mean this? Is that what you are talking about?

Bert: Well, those little tiny little …

Pat: Chris?

Chris: I think, I mean, it might be the way its wings are folded. A butterfly folds its wings vertically!

Pat: Right! There's actually a number of different differences. One is the way it's wings are folded. Another is the antennae! You notice the little feathery antennae: moths have feathery antennae and butterflies don't. Okay.

But *notice what we're doing here*! We're moving from an initial descriptive — Okay. What is it? It's a butterfly or it's a moth. *Why is it a butterfly? Because it looks like a butterfly! Why is it a moth? Well, if you look a little closer, you'll see it doesn't quite look like a butterfly, it looks like a moth! Okay. That's a descriptive definition. We're defining that individual in terms of a universal concept by means of sensible similarities*.

To a large extent our language operates that way. We learn terms by association in terms of what things look like, what they sound like, what they smell like.

How many of you grew up watching Sesame Street? I didn't grow up that way, but I've seen many years of Sesame Street.

[Pat sings:] "One of these things is not like the others!"

[Laughter]

Sensible similarities! Which one looks like the other thing? Which one doesn't look like the other thing?

So there's an awful lot of language acquisition! *Again, this is not a matter of whether or not insights occur! It's a different kind of insight*! It takes some acquisition of insights to learn how to distinguish moths from butterflies in the ways that we were just doing, and also to distinguish different species of moths from one another, different species of butterflies from one another. …

This is here because I love it!!

[This picture differs from the one Pat uses!]

[Laughter]

It's a witch moth. It's beautiful! It's actually going to come back later on to make a different point, but I thought people would know that was a moth, so I didn't put it up!

Conceptualism

se Crocus Geometer Moth
Xanthotype urticaria

Clover Looper
Caenurgina crassiuscula

Corn Earworm Moth
Heliothis zea

[Pat's picture displays eight different kinds of moths]

Lonergan's critique of conceptualism.
Conceptualism as obscuring insight.

Now, what Lonergan — *The context that Lonergan came out of was a context that he came to criticize as* ***conceptualism***. *And he came to the conclusion that conceptualism was at the heart of the oversight of insight, and that the neglect of insight was a terribly serious omission in two thousand years of history*.

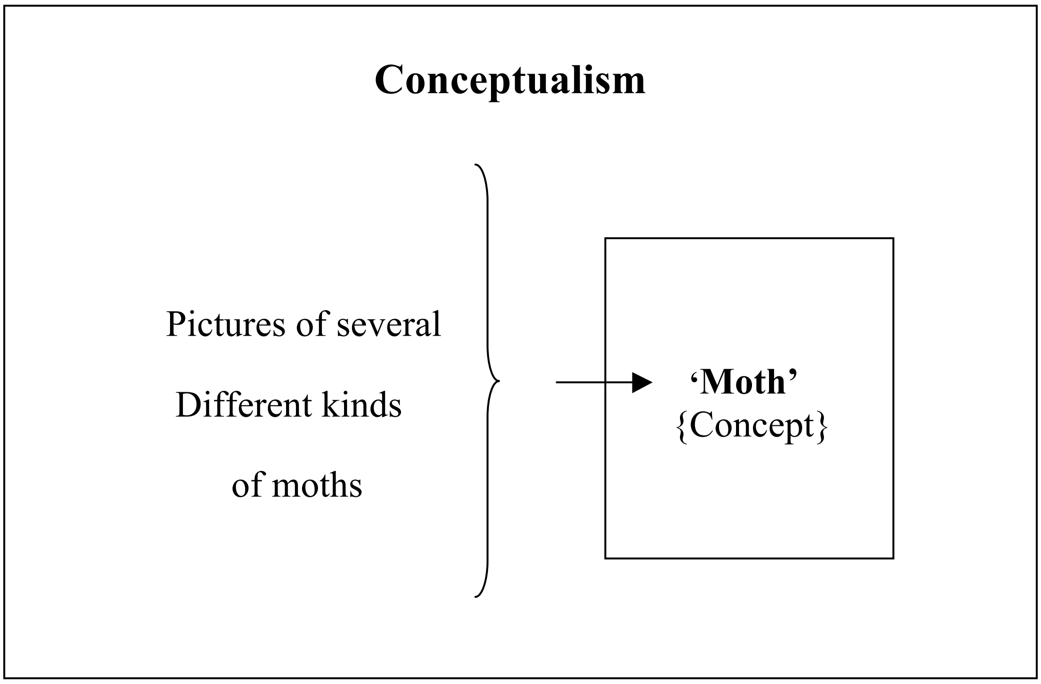
So the great thinkers of the twentieth century — each of them has a way of looking back at the whole tradition of western philosophy from Parmenides to the present saying what they think was the problem — For Heidegger, it's the forgetfulness of being, and so on. For Lonergan, it's conceptualism. *Conceptualism has obscured the phenomenon of insight and its significance*. And one of the reasons why Lonergan is going to spend so much time in this chapter talking about explanatory definitions is because of some of the implications of that oversight! So although he *says* something like: the easiest insights to appropriate are mathematical ones — which I would say they're not, even for me. *I think the reason he starts there is because what's easiest to grasp is the phenomenon of* defining*, and what role insight plays in* defining. It's in mathematical definitions that that's most prominent: that mathematicians struggle not only to prove things, but to define things. And we're going to play around with that a little bit.

What is conceptualism?

Priority of inquiry and insight: changes how we approach reality of non-sensible.

Conceptualism and how it evolved. Insights expressed in concepts.

Why Lonergan starts with mathematical insights.



[Pat's picture displays merely eight different kinds of moths]

So conceptualism is what? Conceptualism says something like: "Well, you see one moth, and you see another! — This [pointing to one moth on his display] was the other picture I was going to put up, but I was afraid people would know they were moths! I was looking — [Pat picks out one insect with the pointer and says:] This one maybe people would think was a butterfly! But anyway — I was looking for a moth, and people would say 'butterfly', and I could say "Why?" "Because it looks like a butterfly!" Even though it's not!

So conceptualism is: well, you see a number of different moths, and then you form the concept moth! And moth is a universal! Now some of you are familiar with various approaches to this, *theories of abstraction: that to go from the numerous particular instances of moths to the concept of moth, what you do is you subtract the things that are not in common until you are left with the essence, or the residue, of what makes a moth be a moth, and you form the concept of moth*. That came under severe criticism at a number of stages by a number of different figures in the history of philosophy. William of Ockham would be one, David Hume would be another, twentieth-century thinkers in the analytic tradition, and so on. Various people are saying when you take away what's specific to a lunar moth versus a witch moth, there's nothing in common! *They're not anything! There are no commonalities! And so what we have really only is nominalism. That's all that's left! It's just the way we happen to use the term 'moth'! We happen to use it to apply to these individuals and not those. And there's no particular reason for that. What they're getting at is there are no common sensible descriptive qualities that cover all the moths*. So I chose a range of moths here where they're so different that it's hard to see the common descriptive features.

Now in that same tradition, understanding — and Lonergan attributes this to Duns Scotus — *the activity of understanding is to then recognize the concept*. So in other words, the abstraction comes first! You abstract the common concept from the multiple individuals!

And *in some writers in the scholastic tradition in which Lonergan was educated, some of them would say the concept pops into the mind unconsciously, and becomes conscious when one understands the concept. So that the object of understanding is the concept! That the concept has to first be somehow in the mind but not conscious, and then made conscious by understanding*.

Conceptualism

Pictures of several
Different kinds
of moths

→ **'Moth'** (Concept) ← Understanding

And Lonergan's claim was that to think about understanding as the faculty which is concerned with being conscious of concepts misses what an insight really is, and many of the implications of it.

Priority of Inquiry and Insight

What is that?

Insight
(Understanding)

Lunar (or other) moth
(Descriptive concept)

So, by way of contrast, what we saw before was: For Lonergan what we begin with, in some cycle of our understanding, at some point, are experiences, and we ask, What is that? And we have an insight, which is *his* meaning of understanding! And we express the insight in concepts. We express the insight, in this case [referring to the picture Pat displays, which differs from the above] lunar moth, as a descriptive insight. It's a lunar moth because it looks like a lunar moth! It has that very different wing pattern, the particularly brilliant color, it's very large, and so on. Okay?

So Lonergan is going to argue that concepts and that definitions are situated within this richer context of inquiry, puzzling things out, images, insight, and so on. But in our ordinary common sense, we are not frequently engaged in the problem of giving a definition of something! We've done an awful lot of our defining in the first couple of years of our lives when we learn the English language and its proper uses.

So the reason for focusing — *One of the reasons for focusing on these mathematical examples is because they allow us to understand and to appropriate better the role of insight in concept and definition*.

Why is this important? We'll see some of the implications of this later on in the semester, but *one of the things that tends to happen if your notion of concepts is this conceptualist notion of concepts, is it makes the question of the reference and the reality of concepts very problematic. Are universals real? Are concepts real*? We were talking a little bit last week about Hume, and how for Hume both substance and cause don't correspond to impressions or ideas, and although he doesn't immediately draw the implication, one of the implications is: *Well, if they don't correspond to images or impressions, do they have any reality? Do they really refer to anything*?

And so conceptualism, particularly when it goes in a nominalistic direction, makes problematic anything having to do with the reality of what you can't immediately see, what doesn't immediately relate to your sense perceptions. And for Lonergan, the priority of inquiry and insight changes the way in which we're going to approach the question about the reality of the non-visible, the non-tactile, the non-sonorous! It doesn't settle the question, but it puts it in a whole new perspective, so that it can be approached differently. That's something that he's going to get to really not until about chapters twelve and thirteen.

Conceptualism

"Thus as a result of the perception of such and such animals the general idea of Animal is formed, and this latter serves to form yet wider conceptions."

Aristotle, *Posterior Analytics*, II, 19

Now where does conceptualism come from? It doesn't really come from Aristotle! It comes from a misreading of Aristotle. I've done a little bit of writing about this part of Aristotle's work, the *Posterior Analytics*, which is *his work on the nature of science and the nature of scientific explanation*. It's called the *Posterior Analytics* because, for whatever reasons, his original work, *The Analytics*, got divided into two parts; one was more or less about Formal Logic, and the second was about his theory of science. And they got separated into two different collections. It is clear that he wrote parts of them at different times, and that may be the reason, but it really is the latter part of *The Analytics* is what it really means.

And in there, at the very end, the very end of this study of science and logic, Aristotle has this rather famous reflection about *induction*. What he says is maddeningly terse. And so *it is therefore open to a number of interpretations. And one of the interpretations has been the interpretation that went in the direction of conceptualism*. And there's a couple of paragraphs there, but I've just taken one of the sentences out, which is often used:

> "*Thus as a result of the perception of such and such animals,*" so in other words, that collection of moths that we saw a moment ago, "*the general idea of Animal is formed*," or if you like, the concept of Animal is formed, "*and this latter serves to form yet wider conceptions*."

So the idea of *induction* is, after you have seen enough individuals, you form a general idea, a concept, that's not tied down to the specific individual perception, and that's how we get our general ideas. What Aristotle does say there is more subtle and I think richer, but nevertheless, sentences like this one in Book II, chapter 19 of the

Posterior Analytics, have laid the groundwork for an awful lot of thinking about how we form our concepts, and how we use language, and what its reference is, and so on.

And as you can see in this sentence, Aristotle doesn't mention — doesn't use the word 'insight', or the Greek word for insight. *I think you can find that Aristotle was keenly aware of insights, and he was keenly aware of the fact that we formulate our insights when we form definitions*. And he has some very interesting things to say earlier on in that work about the formation of definitions. But *this is the place where conceptualism originates, and it is carried through the ancient philosophers, the medievals, the moderns, and into the twentieth and the twenty-first century*.

Lonergan proposes a shift to explanatory definition.
Another exercise in self-appropriating the process of explanatory defining: Geometrical figure.
Descriptive versus explanatory defining.
Science is often said to impoverish experience through abstractions.
Yet Lonergan speaks of an "enriching abstraction" that adds to our experience.

Okay. So what we're going to do is try to do what Lonergan suggests, which is to shift to talking about explanatory concepts. And let's just start with, you know, what is this?

What is it?

Why is it a right angle?

What makes a right angle be a right angle?

Why is this a right angle? What makes a right angle be a right angle? … Byron?

Byron: Two lines intersecting at ninety degrees!

Pat: What's ninety degrees?

[Byron smiles, and joining his hands, displays a right angle]

[Laughter]

Pat: What did Byron just do, the latter bit? … Elizabeth?

Elizabeth: Was it a descriptive definition?

Pat: *Yeah. He just gave a descriptive definition. Okay.* … Why is that a right angle? … Stephanie?

Stephanie: The two lines are perpendicular to one another!

Pat: What does it mean for lines to be perpendicular to one another?

Stephanie: They're not parallel? [She laughs!]

Pat: Ah, well, let's see! Ah, the angle that my computer screen is forming with the keyboard is not parallel, but it's not a right angle! … What makes a right angle be a right angle? … Okay.

Now, let's just stop for a moment, and just notice that this is what the exercise is. How do you go about defining? How do you go about forming a concept? Now, everybody recognized that to be a right angle, apart from the fact that I wrote 'right angle' up there!

[Laughter]

> *Everybody recognized that to be a right angle but now we are trying to ask why is it a right angle? So notice that the shift in defining is from: What is it? What's the right word for it? What's the right language to use for it? What's the right description of it? How does it look to me? to something else! We're trying to define it in terms of how it relates to other things*!

So explanation — Now this is something that Lonergan is going to come back to in chapter three. *He is going to make a very strong argument which is different* *from most of our impressions of mathematics and science. He is going to make the strong argument that mathematics and science, and in general, theoretical enterprises are enriching abstractions! They are enriching abstractions*!

Why is conceptualism such a problem? Because it makes it look like what we're doing when we're doing theoretical and conceptual activity is impoverishing! And there is a great deal of resistance, properly so, in philosophical traditions, in theological traditions, and in literary traditions, *there is a great deal of resistance against the impoverishing of experience*.

Edmund Husserl in particular rails against the "natural attitude". And the natural attitude, the thing that he finds problematic about it, is that it diminishes our experience, puts in place certain kinds of scientific explanations for our experience, wraps up the rest and throws it away! That's what — If you think that concepts are formed by abstraction, by throwing away the things that are not part of the common experience, the tendency has been therefore to dismiss large fields of human experience, and to substitute — And that it is to be found in all kinds of arenas, so there's a way in which *materialism* and *naturalism* will argue that everything's explained by the laws of physics; there's a way in which certain kinds of evolutionary thinkers will say everything is explained by natural selection; certain kinds of political thinkers will say everything is explained by the lust for power. And so on and so forth!

> *Lonergan is a thinker who is going to continually push to reopen the question. And so, by putting the emphasis on insight rather than abstracting away qualities, concepts then enrich, because they add to our experiences something that's not there, rather than substitute for those experiences*.
>
> *But in order to catch that you have to catch yourself in the process of: how are these explanatory concepts formed! And how they form in this flow, this network, this association of experiences, images, inquiries, insights, formulations*!

Continuation of the defining exercise.

So let's go back. Some other people had some other ideas. What makes that be a right angle? Why is it a right angle? … Natalie?

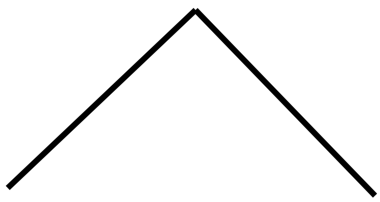
Natalie: Two things! Perhaps one could say it's the meeting of a perfectly horizontal line and a perfectly vertical line? … Or, a corner of a circle?

Pat: Okay. You did two different things there, and I want to make an important distinction between the two things that you did. The first thing was "a perfectly horizontal line and a perfectly vertical line." …

What is it?

Why is it a right angle?

What makes a right angle be a right angle?



[Laughter]

It's [unclear remark]! It's been around a while! Is that a right angle?

Natalie: Yes!

Pat: Okay! So now, another —

Sharon: — If one were perfectly horizontal, then the other one would have to be perfectly vertical! Can we just put an if-clause in there?

Pat: Sure! Sure! That would be fine! And what Sharon just did is to engage in the sort of thing that we do when we're defining.

Now, Lonergan gives that example of defining a circle, so why didn't I just use the circle? He gave you the example of defining a circle! So I'm giving you some other kinds of exercises here, *for the sake of catching what we're doing*. So remember Lonergan says "**suppose**"! Suppose the lines are thin, suppose the hub is contracted to a point! And so what Sharon did was to say well, suppose one was perfectly vertical, then the other would be perfectly horizontal! Okay? And so that's how we're moving forward here. Okay?! …Donato?

Donato: So going back to when we said the lines were perpendicular, or one was perpendicular, so that if we continue one of the lines, then we would have two angles on each side of the one that is not continued, which would be equal!

Pat: Aha! *Now notice that what Donato did was similar to what Natalie just did*. What's the difference between — Now, one of the things about vertical and horizontal is: how do we determine vertical and horizontal?

Student: We use a reference to do that.

Pat: And what's the reference?

Student: It would be another line …

[Several students speak at the same time]

Pat: Well, over here, people are saying something different?

Student: It's, like, in relation to how you are looking at it.

Pat: Right! *It's in relation to your body*! Zie hat rechts, auf Deutsch, means you are right! It means you are standing up! You're not laying down in the gutter, all dirty and full of gunk! You're an upright person! The fundamental meaning of right, in the Indo-European languages, which includes Greek, is to be upright! Be a citizen who can hold his or her head up high and shoulders back! And geometry came after that! This is a right angle, from a descriptive point of view, because it is oriented the way an upright being is oriented on the earth, with his or her feet on the ground. Okay? *So it is descriptive. So when we talk about horizontal and perpendicular, there is a residue of descriptive meaning there.*

But what Natalie and Donato did was something different. So Natalie, what was your second definition of this figure?

Natalie: The square of the circle.

Pat: The square of the circle. And Donato said?

Donato: If you extend one of the lines so that you have two angles, and they'll both be equal. That would show that it's a right angle.

Pat: Right! And Donato's definition is in fact the definition that Euclid gave!

Explanatory defining is in relation to other things.

Now Lonergan has a remark in there about right angles. If you go through the list of the thirty some odd definitions in Euclid's *Elements*, you will discover that some of them are very descriptive. A straight line is a line that lies evenly between its extremes. Well, what does 'evenly' mean? What does 'evenly' mean? It means if you look at it, there's no bumps! It's means — it's like — I don't know if any of you play pool: if you take a pool cue, and if you look down, you can tell if it's straight because if you hold it up to your eye, and you can't see anything, it means that all the points of the pool cue are behind the end. But if it's bent, you'll see some of it poking out from behind the end. That's what he means by 'evenly'. It's a descriptive definition of a straight line.

But when he comes to a right angle, he doesn't do that: he doesn't say it's upright; it's perpendicular; if one is horizontal, then the other will be at a right angle to it. He doesn't use the descriptive qualities. *He does it in terms of how things relate to one another.*

A right angle is a right angle if you extend this line and if these two angles are equal to one another. That is what makes a right angle be a right angle! And that, by the way, is why it's ninety degrees. It's not exactly why it's ninety degrees, but *ninety degrees is a right angle because a right angle makes the two adjacent angles equal to one another*, and that happens to measure to ninety degrees. *But the more primitive definition here is in terms of how things relate to one another.*

What makes a right angle be a right angle?

"When a straight line standing on a straight line makes the adjacent angles equal to one another, each of the equal angles is *right*, and the straight line standing on the other is called a perpendicular to that on which it stands."

Euclid, *Elements*, Book 1, Definition 10

Natalie's definition is also an explanatory definition. And which one you make first and which one you make second is a matter of how you work out your conceptual system. But what Natalie did is the same thing. She related a right angle to other things, in this case a circle. And a right angle is — she would have had to amplify it a little bit: if you draw two lines from the center of the circle so that they intersect the circumference and cut it exactly into one of four equal parts, then that's a right angle!

Those are explanatory definitions: when you are relating things to one another. Okay!

Lonergan does not privilege explanatory or scientific insights.
Descriptive and nominal definitions involve different kinds of insights.

Pat: Byron?

Byron: You kind of answered this. If Natalie related her definition to you or to herself, then it would be in fact a descriptive definition?

Pat: That's right! But it can be so — Because we are so used to — A lot of our insights come that way! *As Lonergan says, it's not that there's insights only in the explanatory definitions. And there is a tendency to assume that Lonergan must be privileging scientific thought as the only place where insights appear. That's not the case*! He says that it takes a lot of insights to use nominal definitions. He says that these explanatory definitions are insights into how things relate to one another.

You may have had the experience of seeing something and thinking "That reminds me of something!" *So you've got an image, a sensible image in front of you, and you've got a question about that image. What is it like? And you're trying to get the insight into what it's like*! So descriptive definitions and nominal definitions involve insights, but it is different kinds of insights.

Science is about relating, about adding intelligibility to experience.

The explanatory definitions of science transcend our own interests and concerns.

And this exercise is not to privilege explanatory definitions or explanatory concepts over others. But rather to take them as moments when a couple of very, very important things happen. And one of these important things, what we're seeing right now, is that we understand that it's a right angle, but we haven't been able to put it in terms of what it's related to. What we're trying to do is to figure out what sorts of things are right angles related to, so that we know that that's what makes them be right angles.

> *So we're adding what he is going to call intelligibility to our experience. We're adding those experiences into a network of relationships. That's what explanatory definitions are all about! That's what he's going to argue is at the very heart of science! Science is about relating! Science is about relating that takes us beyond the narrow confines, the limited confines of our interests and concerns. It's not as though our interests and concerns are inconsequential, but they do have limits. And science is concerned ultimately to learn how everything is related to everything*!

Student question regarding the relationships of imagining, understanding, and explanatory defining. Mathematicians can imagine without having to eventually return to sensations. Scientists use sensations, but must ultimately return to sensations. In neither case can thinking and understanding be bound by sense or imagination.

Pat: Chris?

Chris: I have a question. I don't know how Lonergan would deal with this kind of thing particularly. But the original image was somewhat deceptive, because it didn't show that one line extended! So eventually we arrived at the explanatory definition by imagining some sort of extended line! But how would Lonergan respond to that? Because I know he wants to sort of prescind from, I guess, imagining or, you know, imagining some sort of different image, I think, at least based on chapter two! We had to kind of imagine that separate image in order to arrive at the insight. But maybe perhaps if you started with that image, we would have arrived at the explanatory definition a little bit faster, based on how we were engaged visually! What would he say, or would he support that, or how would he respond to that?

Pat: Well, the first thing he would say is Bernard, you're being sneaky. It's a pedagogical approach. Now the thing in chapter two, if I'm understanding what part of chapter two you are referring to, *the thing in chapter two is he's making a contrast between what a mathematician does and what a scientist does*. And mathematicians can imagine all sorts of things. They can imagine surfaces that get twisted and turned and tied in knots and so on, that they may never have actually seen that way, and think about *them*. He means to contrast empirical science with mathematics by saying that *when you're doing empirical science, the empirical business means that it has to have actually to do with your senses. He never says you can't use your imagination! He only says that you must use your senses. So Lonergan, to the best of my knowledge, never ever says that scientists can't use their imaginations*.

We're going to see a little later on that there is the intuition or imagination problem. And that has to do with implicit definition. And there is a way in which we can allow our imagination to substitute for our intelligent formulations, and that he is concerned with because there is a way in which when your imagination [does he mean understanding?] is not being properly formulated, you're drawing upon assumptions that you haven't critically examined. *So there is a particular problem with imagination versus intelligibility.* And that's really a part of what he's getting at there. *But he never says, and I'm quite confident he never would say, that scientists ought not to use their imaginations. It's rather to not attribute to imagination what should not be attributed to imagination.* Okay? Fair enough?

Student question regarding going from the general to the particular, the conceptualist approach, the role of inquiry. Insights of application to concrete situation are needed. This is not a mechanical process, but a creative and subtle one.

Pat: Matt?

Matt: I was just wondering if you can look at this: on the math side it seems to be using your imagination, if you can call that maybe the general, and then the empirical science would be the particular? He doesn't use those terms, but I mean just going back to, you had the picture of the moth just being the general picture of something that looks like a moth, then his insight would be the part from getting a hold of the general to the particular through inquiry and an insight, and the final insight being the particular that that is, if that is a lunar moth. Can you kind of use him for — his bit about science as being relating the general to the particular?

Pat: That's jumping ahead a little bit to things we are going to come to!

Matt: It seems like it's an easy fit. He's —

Pat: It is too easy! *It's part of the conceptualist tradition. So part of the conceptualist tradition is that the concepts come from repetition and then you have an understanding of them, and then you apply the concept to particulars. So you look for a particular that has that generality in it.* People talk about "filling out the abstract formalism of the concept with the concrete sensible content". So you get the form content. And he's really not going to do that!

Matt: But if you do it through inquiry instead of just looking for the general in the particular, and you arrive at it through a stream of inquiry like he says? Maybe that's kind of after the fact!

Pat: Well, the phrase 'after the fact' is the important thing! *We're always in the middle of the stream. And the stream for Lonergan has a lot of these repetitions of experiencing, questioning, insight, action, transforming your experience, and so on*.

So there's a key phrase in chapter two! — Let me see if I can find it fairly quickly …. So this would be on page seventy. And it's the second paragraph in section three on page seventy:

> **For just as insight is a necessary intermediary between sets of measurements and the formulation of laws, so also it is needed in the reverse process that applies known laws to concrete situations.** (*CWL* 3, p. 70).

Now, to generalize that to the case that Matt is asking about, *just as you need insights to learn concepts, to learn nominal definitions, descriptive definitions, explanatory definitions, so also you need insights to apply them. So the question of What is this? and drawing upon my previous insights and my previous formulations of those insights requires insights of application*, what he is going to call — In chapter six he is going to talk about insights into the concrete situation. *So the way that we use our generalities is always by adaptation and modification and nuance. And the adaptation and the modification and the nuance also comes by inquiry and insight*.

There's a tendency in the conceptualist tradition, which maybe nobody actually speaks this way but there's a tendency to say you got the concept and you apply it to the concrete! You've got the rich details of one of those moths and you apply the concept moth to it. You fill in the abstract formality — the formalism of the concept with the rich sensibility of the sensation.

What gets left out in that is the fact that you've been engaged in inquiring and understanding even to do that! It looks like a very mechanical process otherwise. But it's not! It's not mechanical. It's an intelligent and creative process! It's not a

Picasso creativity, but nevertheless, it's the normal, ordinary, everyday creativity of human living. Okay. So does that help?

Matt: Yeah. Is he trying to draw light to the stream between the two, and to kind of forget that there are the two but to focus more on how we seem to jump from one to the other without paying attention to what we do?

Pat: Yes! *Yes, it's all a matter of paying attention to the subtle, the very familiar ways in which insights and inquiries operate in our lives but we don't notice it.*

So what we've been doing up until now is *how we formulate general concepts*. You're asking the question of once we have formulated a general concept, how do we apply it? That too requires or involves inquiry and insight. Okay!

Student question on whether Lonergan agreed with the conceptualist definition of abstraction.
No. Arriving at concepts requires insights. In conceptualism, the process of arriving at concepts is not accounted for.

Pat: Greg?

Greg: Would he then agree with the conceptualist definition of abstraction, but disagree with how we then re-apply it to real life instances?

Pat: He basically does not agree with the conceptualist definition of abstraction, because there is no — how do I want to say this — abstraction seems to happen for no particular reason, whereas for Lonergan, defining, explanatory defining, is a very intelligent process. It requires a lot of inquiry, a lot of insights, and the concepts don't just sort of pop as generalities! We actually have to think them out, and formulate them out, and try them out, and test them, and refine them.

Greg: Okay!

Pat: So — Now there *is* something about abstracting — when we get to the empirical residue business a little bit later on today, we'll talk about that a little bit. So it's not as though he doesn't think that there is *no* kind of abstracting going on. But *abstracting is normally thought of and talked of and discussed in the philosophical literature in ways that don't pay attention to the richer context that he thinks is so important*!

Greg: So it's more deliberate in terms of the way that we — Because he defines it in there as grasping the essential and disregarding the incidental, which sounded like your kind of characterization of conceptualist abstraction. But you would say that the way that we do that —

Pat: That's right! That's right! Yeah. And you've kind of jumped ahead to the section on empirical residue! That's where that passage comes from. So I'm going to try to come back to that in a little bit of time.

Student question as to whether mental disorders may be due to a disruption of the process of insight.
Mental illness is indeed a blockage of insight; see Chapter 6.

Pat: Mary?

Mary: I just have a question in regards to like, I guess psychological or like mental disorders in which people like — Would Lonergan say that people's streams, in that sense, like their insight, is altered, because they're probably paying attention to other things that wouldn't naturally make your insight — or not only in regard to definitions but in general? I'm just trying to —

Pat: Yeah. You have kind of hit the nail on the head! That's exactly what he does say in chapter six, the section on "Dramatic Bias". *He is going to give a characterization of mental illness in terms of the blockage of insight*! So when we get to chapter six, we'll look at that in greater detail. Whether he's got the whole story on mental illness is another question! But that's a fundamental component. So you're exactly right. That's exactly what he does say! Just not here! It's coming up later. It's a pretty interesting — He does some pretty interesting things with it.

Student question as to whether empirical definitions are always in a state of conceptual flux, subject to revision. Not exactly; incorrect concepts are revised, by means of corrective insights. Examples from biology.

Pat: Michael?

Michael: I had a question about this in relation to the problem of induction that you referenced. There's another moment though in the *Posterior Analytics* when Aristotle says something like "All triangles have three sides, and when I say that, I don't mean that every triangle you produced has three sides. What I mean is that every triangle has three sides." And that works fine for a mathematical definition because in a mathematical definition, the image there has been engendered by the concept. But for empirical definitions, like the statement, say, all swans are white, you have that problem of induction, because we're not saying that the swan has been engendered by our concept of a swan. We're saying that we've experienced a swan and they all seem to be white, but there might be a black swan, and of course, there is.

And the other question that I had was say, like the All men are mortal —

Pat: Okay. Let's stick with that question. I'm not sure I got the question though.

Michael: My question is then, are empirical definitions always subject to revision, and always in a state of conceptual flux?

Pat: Okay. … Not really! The famous chestnut about all swans being white as an example of induction: the big deal on that is that the species of swans that were black weren't discovered until the late nineteenth century in Australia, I think. So that's why that became such a commonly used example. *That is in the realm of descriptive definitions. In the realm of scientific explanatory definitions, concepts either are right or they are replaced.*

So for example, *Newton has a definition that's —it's actually kind of funny, because it's quasi — as we'll see this when we get to chapter five, it's a kind of a quasi-descriptive definition of space, and also of time. But it's defined in a certain way. You could say that implicitly Newton wanted to define natural space as*

Euclidean space. Euclidean space is Euclidean space, it just apparently is not the space that we live in. We don't live in a Euclidean space. We live in a non-Euclidean space.

Another example would be in his Two New Sciences*, Galileo gives a definition of natural fall, the ways in which things naturally fall if you drop them. And it has to do with constant acceleration. It turns out that things don't actually, in this empirical world, fall with a constant acceleration! It's a slightly increasing acceleration that's interfered with by air resistance. That is how things naturally fall! So there's a natural definition — There's his definition of natural fall: it depended on, came out of the data of experience, the data of his experiments, that raised his questions, that led to his insights. It just turned out that he needed further corrective insights that would eventually replace that definition.*

So it isn't a matter of — I've forgotten how you put it — It isn't a matter that they are constantly under revision. It's that we do replace them, but we don't replace all of them.

Michael: So it's your insight into what a swan is that allows you to include a black swan when it's discovered under the umbrella of that concept!?

Pat: Ahm, well, *it did involve a modification in the definition of swan.*

Michael: But the descriptive definition of swan?

Pat: The descriptive definition. Yes.

Michael: Why doesn't the descriptive definition of swan still suffice to include the black swan?

Pat: Ah … I believe they're different species!

Michael: Okay!

Pat: But they might be a different variety. I'm not sure if they interbreed!

So the shift in biology to interbreeding as the way of defining a species came at the beginning of the twentieth century as the proper way of defining a species. So the whole notion of species underwent a major transformation in the twentieth *century. The significant thing is, it defined organisms in terms of their relations to one another, their breeding relations to one another. The way in which organisms are related sexually to one another became a fundamental defining feature, whereas up until that time there were a lot of ambiguities about what was and was not part of a species, what sensible similarities put something in the same species and didn't! There was a lot of discussion, dispute, confusion and disagreement. Once the community of biologists accepted interbreeding as the defining feature of a species, it changed the whole way in which that discussion took place*.

Michael: So that's an explanatory —

Pat: So white swan is a totally descriptive definition!

Michael; But the interbreeding is an explanatory way of defining.

Pat: That's right!

Michael: But that was sort of linguistically in a committee of scientists engendered!? So even explanatory definitions then can be promulgated by a community?

Pat: Yes. Absolutely! Natural science is an interpersonal, intersubjective phenomenon. That's right! We'll see this a little bit more when he gets to chapter six, when he talks about the ways in which insights underpin inter-human communication. Although he doesn't do that in the chapters of science, it is applicable back to the stuff he has to say about science.

Student question on role of imagining and images in definition.

The role of inquiry in guiding imagining toward understanding and defining.

Pat: Okay. One more — Jonathan? One more question, and then I'm going to move on!

Jonathan: My question is about the creativity of imagination. So pedagogically, you gave us the right angle as shown, and then we had to imagine this different image in order to conjure this explanatory definition.

Pat: Yes!

Jonathan: And so my question is what guides that imaginative creative process in adding image data to then inquire about, or have insights about? Is that just trial and error? Is it just trying different stuff out? Or is there some kind of intelligence to that sort of pre-explanatory insight?

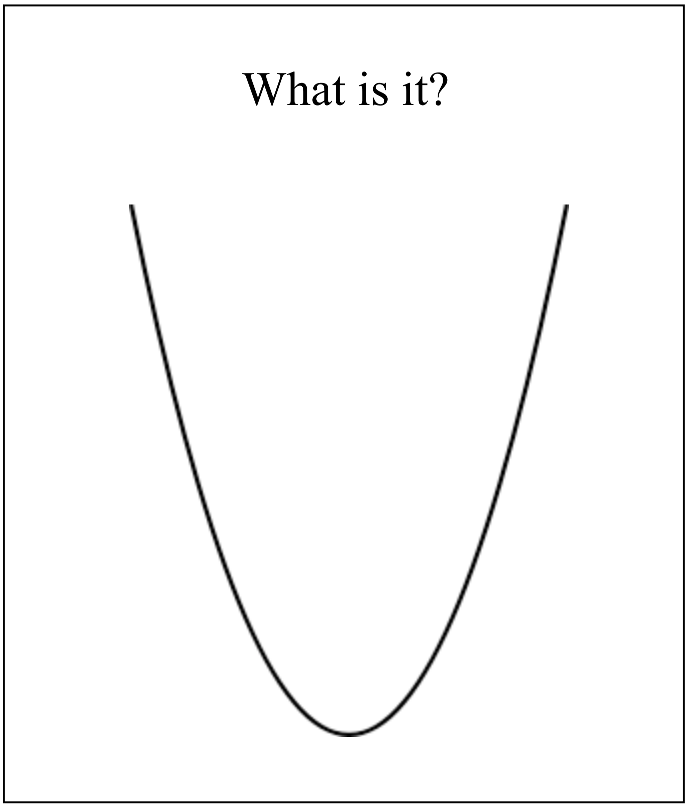
Pat: *The answer that I would give to that, and that I think Lonergan would give is: It is an intelligent process. It's inquiry as intelligent. The fundamental mode of being intelligent is to be inquiring, to be wondering, to be seeking! And in seeking, there is an anticipation that guides what we do*.

I noticed that nobody got up and went out the door to look in the laboratories to see if the answer to *what makes a right angle be a right angle* might be residing there! Well, how did you all know that? *You knew that because you had a sort of an anticipation of what an answer might be like! And that anticipation, that interrogative anticipation, guides our imagining*!

As we'll see later on in a later chapter in *Insight*, Lonergan will talk about the way in which *our inquiry elicits from our subconscious images that it has an anticipation will be helpful. Now they are not always helpful! But it's our inquiry*! Otherwise, how could there be trial and error? You've got a random association of images. How would you know which ones were giving you the insight and which ones weren't, unless they were the images that answered the question that elicited the image! *So it's your inquiry that's doing the structuring of your imagination, that's bringing up past memories, giving you the power, so to speak, to transform familiar images into slightly unfamiliar ones to give you the insights*. Good. Okay. So it's very much inquiry. *Inquiry is the phenomenon that's responsible for making your imagination be a creative imagination, rather than random association*.

Another exercise in self-appropriating explanatory defining: Conic sections.

Okay. So I'm going to move on!



Okay. Another attempt! Well, what is it? …. Everybody knows that this is going to be a — There's some deception to this — about the question! What is it? … Chris?

Chris: I'd say that was a moth, but —

[Broad laughter]

Pat: That has to do with the empirical residue!!

Chris: — I'll go for a parabola!

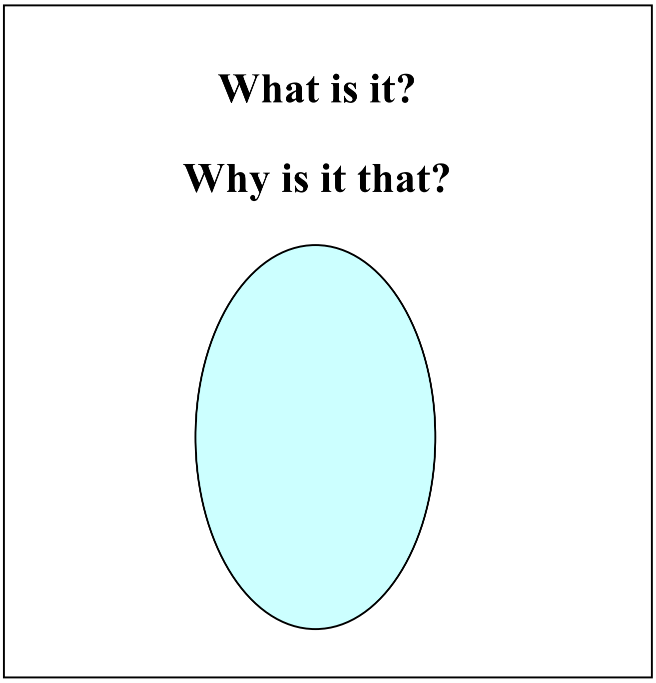
Pat: Okay! How many people would say it's a parabola, if they didn't think that Professor Byrne is up to something devious?

[Laughter]

Okay! *Why is it a parabola*? … Chris, why did you say it's a parabola?

Chris: As previous encountered experiences that I had of parabolas and how they appear —

Pat: Sure! Sure! How it appears! It looks — *It appears like a parabola. It appears to be a parabola. It looks like a parabola*! … *But it wasn't a parabola*!



It was half of an ellipse! … *What makes an ellipse be an ellipse*? … *Why is an ellipse an ellipse, and why is a parabola a parabola*?

So this is another illustration to get you to see what the difference and the relationship between a descriptive definition and an explanatory definition is.

Student question about exposure to universals and whether definitions can be wrong.

There is so much to be understood about any actual image or entity, that no one concept or definition exhausts all of its intelligibility.

Pat: Mary?

Mary: If someone isn't exposed to universal concepts or definitions or ideas of things, would that mean that their definitions, no matter what category they fall under, are — I don't want to say incorrect, but they all — Like if I had never seen that before, and had no concept of it, I might call it something else that the rest of the world didn't! Even though it's relating to me and my purpose, whatever I think that is here that I'm related to, would that mean that it's incorrect? Like is there light on the fact that people's definitions, or what-not, can be wrong? Do you understand me?

Pat: Ahm, I think I do. There's a sort of a way in which, whatever insight you have linked to something — and I was going to come back to our friend the witch moth a little bit later on! … I can't jump all the way ahead to it, but the witch moth — *There is so much to be understood about it! There are so many experiential elements, and there is so much to be understood! You could spend — You could do your whole doctoral dissertation on it! Because there is so much to be understood there*! *Each insight that you have about the witch moth is the ground of a multiplicity of concepts that you have to work out! None of them is wrong, but they might be terms or ideas that other people aren't using.*

So the thing about nominal definitions is: they do explicitly refer to a community of language users, and the insights that you have to have in order to be what's called a communicative competent participant in that linguistic community. You can have insights, you can use concepts to express them, but if it's not the way that the rest of the community is using those concepts, it's confusing! So the insight isn't exactly wrong, but you're not using language in a way that communicates with the rest of the community. Does that help a little bit?

Mary: Yeah. I was just trying to get at the idea of, like a hermit or someone living alone, if like the insights that they had were a different breed of insights than everyone else?

Pat: Almost certainly some insights that a hermit would have would be different than yours or mine. And almost —

Mary: What I'm saying is — Oh, I guess it's still categorized as an insight!

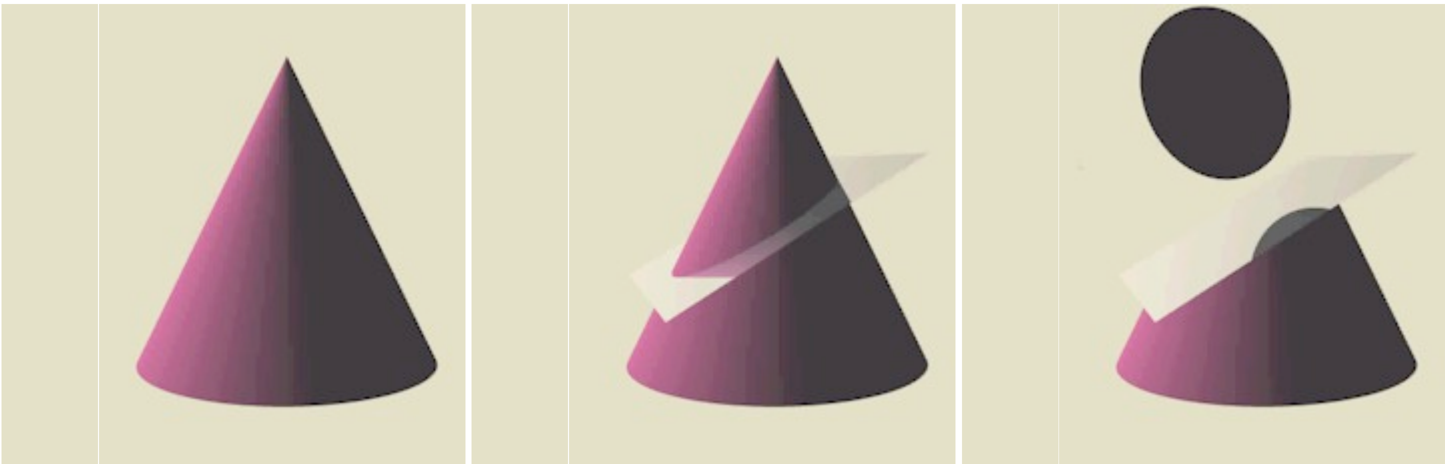
Pat: Yes, yeah! And almost certainly some of the hermit's insights would be the same as ours. But again, we're sort of getting ahead of the material. This is the way Lonergan wrote the book and that material is stuff that he takes up in a later chapter.

Further illustrations of explanatory definition as relating things to each another.

Why is an ellipse an ellipse?

What makes an ellipse an ellipse?

Things in relation to one another!

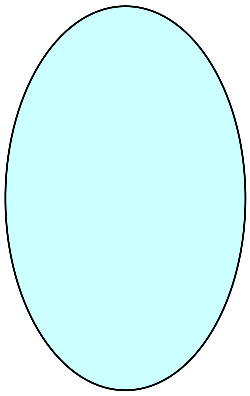


Okay. So what makes an ellipse be an ellipse? Well, originally what made an *ellipse* be an ellipse is that it is a sectioning, which is to say, a cutting, from a cone!

What makes an ellipse be an ellipse is that the cut has to begin in one side and come out the other. Any cut of a cone will produce a surface shape that's an ellipse provided that the cut goes all the way through! If it goes parallel to the opposite side, it's a parabola. If it goes in a way that never comes out the other side but is not parallel to the opposite side, then it's a hyperbola. If it goes straight across it's a circle.

What is it?

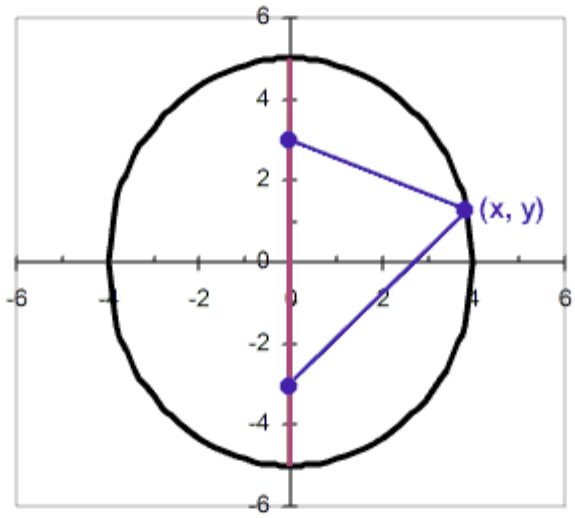
Why is it that?



So this is a way of defining an ellipse in relationship to other things.

And here's another way of defining it:

> **Definition**: An ellipse is all points found by keeping the sum of the distances from two points (each of which is called a **focus** of the ellipse) constant. The midpoint of the segment connecting the foci is the centre of the ellipse. An ellipse can be formed by slicing a right circular cone with a plane traveling at an angle to the base of the cone.



You can show that this is equivalent to the way — Oh, let me show you — This is an interesting thing! When I teach the Perspectives Four course, people actually have styrophone cones, and they cut them and do things with them, and so on. Their initial expectation is that it's going to be an oval, and not an ellipse! That it'll be skinnier here [presumably the higher right side of the cut in the cone on page 43 above] and fatter down here [presumably the lower left side of the cut on the cone on page 43 above]. Why? Because the cone is narrower here, and it gets fatter here! So the idea is that as it comes out you'll get something that looks like this! [Pat presumably displays an oval shape that is fatter on the bottom than the top.] And then there is this big surprise when it doesn't happen! And so then: "Well, why didn't that happen?" And in order to understand why it didn't get fatter at one end, and it's just nice and symmetrical along both axes, you have to understand other things about what it means to be related to a cone. And so the whole geometry of conic sections is this vast fascinating exploration about how cones and cuts are related to one another. It's just a marvelous experience for so many!

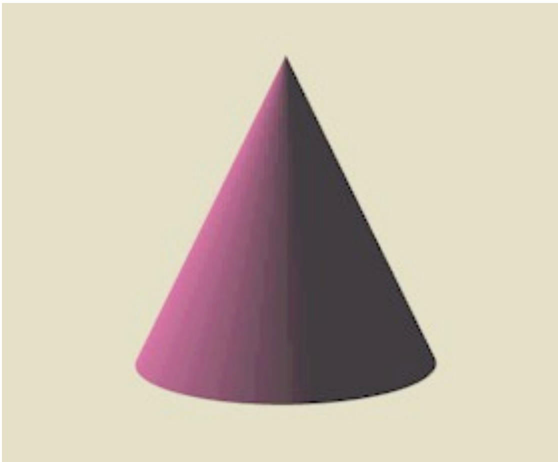
And one of the things that they find out when they do that, is that *an ellipse has, unlike a circle, not one "centre" but two foci; and that the distance from one of the "centres"* [foci] *to a point on the ellipse, and the distance from the other "centre"* [focus] *to the same point on the ellipse will always be the same for every point*! So, if you look over here, that point — for example there's a very short distance there, and there's a much longer distance there, but it's exactly equal to the sum of the distances from any other point on the ellipse to the two foci.

And that’s another way in which things are related to one another, which gives you an understanding of what makes an ellipse be an ellipse, what makes it behave the way it behaves, what makes it be shaped the way it’s shaped! Okay!

I had another exercise, which I’m not going to do in the interests of time, and I was going to ask you: “What makes a cone be a cone?”

Why is a cone a cone?

What makes a cone be a cone?



But we’ll have to leave that for another time.

So let’s stop here and take a break. And we’ll come back in a little time for insights and higher viewpoints!

Insight & Beyond: Lecture 3, Part 2:

Chapter 1, §§ 2-5: Definitions, Inverse Insight, Higher Viewpoint, Empirical Residue.

- Implicit Definition: Insight supervenes on experience
- Content of an insight is the intelligibility of an experience.
- Implicit definition expresses the strictly intelligible content of an insight as distinct from the associated sensible or imaginable contents.
- An exercise in self-appropriation: The problem of imaginative assumptions in Euclid's geometry and the need for implicit definition.
- Deconstruct our tendency to overestimate materiality, and underestimate intelligibility.
- Student question: Words vs. images and artistry in descriptive definitions
- §4: Inverse Insights – Treated in a different order than occurs in the book *Insight*.
- Details of why is the diagonal of a square incommensurable with its side; Why is a surd a surd?
- Inverse Insights as opening up the possibility of:

  § 3. Higher Viewpoints: Led to redefining the idea of ratio, later the idea of number itself.
- Inverse insight as the route to a higher viewpoint.

- §5 Empirical residue.
- No *immanent* intelligibility.
- Leaves open the possibility of a transcendent intelligibility
- Examples of multiple identical images of the witch moth.
- What makes them different?
- Intelligible differences vs. merely empirical differences.
- Why did Lonergan include this elusive notion of "The Empirical Residue" in the first chapter?
- Why did he choose to *end* the chapter with this difficult notion?
- Possibly to point to the world of experience as radically underdetermined.
- To suggest that the universe is dramatically open and full of unlimited possibilities.

Insight & Beyond:

Lecture 3, Part 2:

Definitions, Inverse Insight, Higher Viewpoint, Empirical Residue.

23 September 2009

Implicit Definition: Insight supervenes on experience

Content of an insight is the intelligibility of an experience.

Implicit definition expresses the strictly intelligible content of an insight as distinct from the associated sensible or imaginable contents.

Right, just to complete this account of definition, Lonergan introduces this notion of **implicit definition**, and on page thirty-seven, he says:

> **One may say that implicit definition consists in explanatory definition without nominal definition**. (*CWL* 3, p. 37).

And now he would add, *implicit definition consists in explanatory definition without either nominal or descriptive definition*.

Now, let me pause for a moment on why this is significant. *It's significant because Lonergan wants us to appropriate the activity of insight, which, as he says at the very beginning of the "Preface," is an act that supervenes relative to the activities of sensation. It's an act that supervenes, which means it's an act that is different in kind, and comes after our activities of experiencing*! *Our activities of experiencing give rise to questions, and questions are answered by insights, and insights are not of the same sort of activity as sensation, imagination and memory are*!

*And not only is the activity a supervening activity, but its content is a supervening content. The content of an insight is what he's going to call '**intelligibility**'*. So if the content of seeing is color and shape, and the content of hearing is tone and timbre and intonation and volume, and the content of touch is texture and smoothness, wet or dry, cold or hot, *the content of an insight is intelligibility*.

> *And behind this is a long extended argument that is much of* Insight*, claiming that the world is intrinsically intelligible. That the world intrinsically is meaningful*! *And his argument is that conceptualism, by overlooking insight, has lost for us one of the most important sources that helps us to answer the questions whether or not reality is meaningful; whether or not life is meaningful; whether or not being is meaningful*!

So his insistence on the importance of the uniqueness of the act of insight is the uniqueness of the content of insight, intelligibility! *So the deeper level of appropriation is to appropriate for ourselves that what we understand — that the content of our understanding is dramatically different in kind from what we can see, touch, taste, imagine and remember. And so the tendency to eliminate as meaningful, as having any real reference, anything that is not visible or sonorous or tangible is, Lonergan thinks, due to an oversight of insight*! So that's the significance of the intelligibility that is the content of insight and, indeed, of implicit definition!

And in those long chapters that we're going to plough our way through on the natural sciences, over and over and over again Lonergan's point is *the intrinsic role that insight plays in natural science*; *and that much of the treatment of science and the philosophy of science has not paid attention to the essential, recurrent, permeating role of insight in science; because that has the implication that the natural world is intelligible; that the fundamental character of the natural world is not matter, it's not force, it's intelligibility*! Okay?! So that's why he's dwelling on this business about explanatory definitions so early on!

Implicit definition *is a matter of defining without using, or relying upon, nominal concepts or descriptive concepts, without relying upon descriptions which import sensible associations into them, so that you can appropriate for yourself the dramatically different unique quality of intelligibility.*

David Hilbert was a mathematician; he did his most important work at the end of the nineteenth century into the twentieth century — actually did his most important work at the beginning of the twentieth century. He lived just up to the Nazi period, when Jewish people being expelled from the university, and he did what he could to prevent that! Some of his best friends who were mathematicians were being expelled from the university.

David Hilbert (1862-1943)

"Instead of point, line, plane, we should be able to say mug, chair, table."

There is a wonderful biography of David Hilbert by Constance Reid which is called *Hilbert*, and in that she has this wonderful little anecdote about how Hilbert came up with the idea of implicit definitions. And you don't know about implicit definitions, because we haven't talked about that yet! But how did Hilbert come up with it? He came up with it because supposedly he was at a little lecture that was given around a table in a beer garden in Göttingen. And the person who was giving the lecture said: "We ought to be able to do a mathematical proof and say, instead of point, line, plane, we ought to be able to say mug, chair, table!" *And so Hilbert had this great idea that you should be able to do a mathematical proof without a descriptive association*!

An exercise in self-appropriation: The problem of imaginative assumptions in Euclid's geometry and the need for implicit definition.

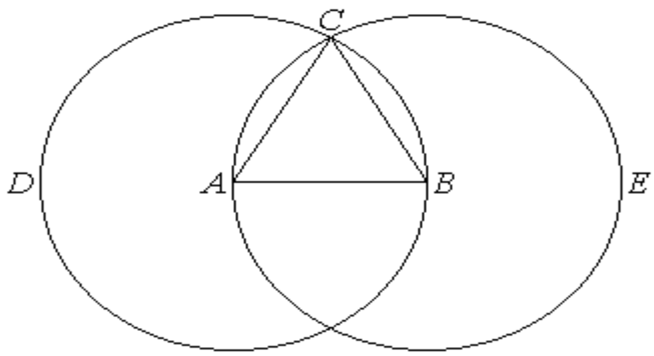
Hilbert's notion then was to try to do mathematical proofs without descriptive association! Now, why would that be important? It has to do with what's called the *Anshauuliches Problem, or the intuitive or imaginative problem in mathematics*. And this problem appears in the very first proposition in Euclid's *Elements*. As you probably know, Thomas Hobbes extolls Euclid's *Elements* as the place where you can really learn what it would be to do a political science. I've always been a little suspicious about whether he really meant that or not! But if that's the case, he was building his political science on a model that was known at his own time to be rather flawed! The very first proposition is a flawed proof!

Implicit Definition and
The *Anshauuliches* Problem
(Problem of intuitive imagination)

Euclid's *Elements*, Book 1, Proposition 1

And the very first proposition is: *Given a straight line, construct an equilateral triangle on that line*. This turns out to be terribly important: he needs it in the second proof, and he needs the second proof to deal with almost all the constructions that follow — at least the books of the *Elements* that have to do with proving things about various rectilinear figures.

So given a straight line AB, to construct an equilateral triangle on it! And he proceeds as follows: So okay, so take that straight line AB (Pat uses his pointer), and use one of it's end-points A as the center of a circle, and use the line AB itself as the radius of the circle, and you can construct a circle BCDB with A as center and AB as radius! That happens to be one of his postulates, that given a point and a line you can construct a circle. He then does the rather clever thing of saying, take the other end point B as another center of a different circle with the same radius BA, and construct that circle ACEA! And now consider the point of their intersection C, and draw a line from the center of one of the circles, say A, to that point of intersection C — because if you have two points, you can draw a line — that's one of his postulates. And then use the other end point B of the line AB, and draw a line from it to the point of intersection C; it's a little hard to do some of this in PowerPoint, but — And voila, you have an equilateral triangle, ABC! Why? Because AC and AB are radii of the same circle BCDB, therefore they're equal; AB and BC are radii of the same circle ACEA, so they're equal; but things equal to the same thing — AC is equal to AB, and BC is equal to AB, therefore AC is equal to BC — are equal to one another!. So you have an equilateral triangle! And now we can go on to Proposition Two!



To construct an equilateral triangle on a given finite straight line.

Let *AB* be the given finite straight line.

It is required to construct an equilateral triangle on the straight line *AB.*

Describe the circle *BCD* with center *A* and radius *AB.* Again describe the circle *ACE* with center *B* and radius *BA.* Join the straight lines *CA* and *CB* from the point *C* at which the circles cut one another to the points *A* and *B.* Post.3 Post.1

Now, since the point *A* is the center of the circle *CDB,* therefore *AC* equals *AB.* Again, since the point *B* is the center of the circle *CAE,* therefore *BC* equals *BA.* I.Def.15

But *AC* was proved equal to *AB,* therefore each of the straight lines *AC* and *BC* equals *AB.*

And things which equal the same thing also equal one another, therefore *AC* also equals *BC.* C.N.1

Therefore the three straight lines *AC, AB,* and *BC* equal one another.

Therefore the triangle *ABC* is equilateral, and it has been constructed on the given finite straight line *AB.*

Pat: What's wrong with that proof? The *Anshauuliches* Problem. …

Student: Did he prove that two radii of a circle are equal?

Pat: Well, that's actually part of the definition of a circle! So just as we saw how he defined a right angle in terms of its relationship to adjacent angles, he also defined a circle as: It's a plane closed figure … It's more complicated than our definition: there's a point such that if you can find that point you can draw lines, and it would turn out that's — we would say that a circle is defined as the locus of points equidistant from a centre. That's actually not Euclid's definition, but they're equivalent! So that wasn't the problem! …

See, you are all caught up in the *Anshauuliches* Problem! An imaginative intuitive problem! … Jeff?

Jeff: Is it that — could it be that we're taking a point to be a real thing instead of just an imaginary marker of a location?

Pat: Ah, you're getting close to it. Now, tell me a little bit more about what you mean?

Jeff: Well, when we were taking a circle — you know, the closest we could get to it is that we imagine a very small point if you will, or a small spot and a very thin line! That the radius isn't really there, just — That's a descriptive definition, so —

Pat: You're getting — You're going in the right direction, because these clearly are not really circles. They are sort of corrals! They're little thick things so that if you were a little bug you'd be able to crawl out of them.

Another student: Is it a descriptive definition of an equilateral triangle?

Pat: No, it relates the sides to one another! It's a plane closed figure composed of straight lines which are equal to one another. So you've got an equilateral triangle … Katie?

Katie: [Some inaudible words]. Is it that the circles are not really the same size?

Pat: No. The circles are the same size, because they have equal radii. This line right here AB in circle BCDB is the same length as this one here that is the radius BA of this circle ACEA. The fact that the circles are equal to one another is not directly — They have to be equal to one another to make this work. But that's not what's wrong with it either. Sharon?

Sharon: Are they in the same plane? Is that an axiom?

Pat: That's a very good point, and I didn't explicitly state it, but Euclid does! If they're not in the same plane, then — Then what? What happens if the other circle is not in the same plane? … Deb?

Deb: They'll never touch!

Pat: They'll never touch!!! Exactly!! Exactly!! They'll never touch!

Student: But they have to be in the same plane, though?

Pat: They have to be in the same plane!

Student: If you use the same radius to draw both circles, don't they have to be in the same plane?

Pat: No. Because you could have two circles that are oriented at an angle to each other using the same radius!

Student: Oh, okay!

Pat: But Deb's point is honing in on it! If they are not in the same plane — and Euclid did not make that mistake — they won't touch!

If they're in the same plane, there's no way he can prove that they touch! There is nothing in Euclid's Elements *that allows him to conclude that those circles will intersect! There is nothing in his definitions, his postulates, or his axioms*. This was actually known about 150 years after Euclid died. Proclus[1] pointed this out as a fundamental error![2] There is no way — He does not establish this! This should have been his first theorem! But he actually doesn't have the equipment to do it! And the

---

[1] Proclus Lycaeus (412 – 485 AD), called "The Successor" or "Diadochos," was a Greek Neoplatonist philosopher, one of the last major Classical philosophers. He set forth one of the most elaborate and fully developed systems of Neoplatonism. He stands near the end of the classical development of philosophy, and was very influential on Western medieval philosophy (Greek and Latin) as well as Islamic thought.

"Wherever there is number, there is beauty."

Proclus, quoted by M. Kline, *Mathematical Thought from Ancient to Modern Times.*

[2] Why does the point C exist? Near the beginning of the proof, the point C is mentioned where the circles are supposed to intersect, but there is no justification for its existence. (The only one of Euclid's postulates that says a point exists is the parallel postulate, and that postulate is not relevant here.) Indeed, some postulate is needed for that conclusion, such as "If the sum of the radii of two circles is greater than the line joining their centres, then the two circles intersect." Such a postulate is also needed in Proposition 1.22. There are models of geometry in which the circles do not intersect. Thus, other postulates not mentioned by Euclid are required. In Book III, Euclid takes some care in analyzing the possible ways that circles can meet, but even with more care, there are missing postulates.

equipment wasn't provided until Hilbert!

> *Now, what happens here is that you have the image, and from the image you get the insight that it happens, but you don't know why it happens! You don't know why they intersect! You can see them intersecting, but — From the image you can get the insight that they intersect, and then you're off to the races! But you haven't actually formulated what it is about circles in planes having a common radius that will make them be intersecting circles*, that will have the effect — that will mean that they relate as intersecting circles! What was needed was a new formulation of definitions about continuity and interiority and exteriority — which geometers worked on, including Hilbert and several people in his generation — so that you could actually demonstrate this. *In other words, they had insights that they had not succeeded in formulating about how things were related to one another.*

And Hilbert of course knew about this problem when he went to the Beer Garden and heard this guy say: "We ought to be able to say table, chair, beer mug!" Because *our intuitive imaginative associations should not be the controlling features in our formulating and in our demonstrating! What should be the control in the future is our explanatory intelligible articulations of relatedness*!

Deconstruct our tendency to overestimate materiality, and underestimate intelligibility.

So when Lonergan talks about the importance of implicit definition, this is what he is getting at! Not to do away with imagination, but to not let your imagination do your thinking for you. To be aware of the fact that it is not the imaginative content, but it's the associated intelligible content that is responsible for giving the answer why! It removes it to a different realm.

If I take something, and push it across the table, why did it move that way? Well, because you exerted a force on that. Well, why does that cause things to move? Well, you can see it moving, you can hear it moving! But you haven't really *understood what it is that makes something move from a state of rest to a state of motion and back to a state of rest, as long as you allow your imaginative associations, with things like occupancy of space, the feeling of pressure on your hands, rather than trying to articulate what it is that is involved in answering the question why does it move! Then the tendency is to make the explanatory features of the world be extension and the impermeability of extended bodies occupying space.*

We're going to talk about that when we get to chapter five, and again when we get to chapter eight! *The fundamental way of what Lonergan is doing is deconstructing the tendency we have to overestimate materiality and underestimate intelligible reality. And a great deal of what he is doing in these early chapters is laying the groundwork for that*. Okay?

Student question: Words vs. images and artistry in descriptive definitions

Okay. Any questions about that before we move on here to Inverse Insights?

Student: Can artistic representation be considered a form of descriptive definition? Or is it only just words that may constitute descriptive definitions?

Pat: Well, we're going to talk about Lonergan's take on art. It isn't a thing that he wrote a great deal about, but what he did have to say about it was, I think, quite illuminating! And the simple answer to that is No! Description ultimately is going to be in the context of what he is going to call the common sense mode of knowing. *And the artistic pattern of experiencing, the artistic pattern of knowing, is distinct! The descriptions that are used in artistic modes are about something else. They're about wonder, they're about revelation, they're about epiphany*!

Student: So in geometry, where so much of the proofs are visually represented, it's actually the words, the verbal explanation, that's considered a definition, and not like this image that you have on the board, for example?

Pat: Well, *moving in that direction*! *But what Hilbert actually did was you can get away from words, and it insists on using symbols that had no imaginative associations whatsoever! Now, the difficulty is that if you have no imagination whatsoever, you also have no insights*! And Hilbert himself was able to get a good balance. He actually has a very fascinating book called "*Imagination in Geometry*" in which there is all kinds of images of all kinds of fascinating surfaces, and things like that!

But there was a school that came after Hilbert that insisted upon never using a diagram or image, and *it is really difficult to figure out what they're talking about*!

Student: Uh, uh!

Pat: *But Hilbert's concern was to get some control over the unacknowledged intrusion of insights associated with images that are not part of your explicit definitions. Because then you end up proving things — You end up thinking you've given the reasons for things but you really haven't! The reasons are there, but they're not really articulated. And in some cases, they're misleading, they're mistaken, and so on, and you don't have a way of criticizing them. So he really insisted on using symbols that had no associations whatsoever*!

Some of you have taken courses in Symbolic Logic: that comes out of this tradition! Why those weird symbols? To get away from the kinds of things — *In other words, you know lots of things from your common sense, you know lots of things from your mastery of nominal definitions and descriptive definitions. But if you're out to demonstrate things, you can't be sort of throwing things in willy nilly from all different sources! You have to — If you're in a court, there are certain kinds of evidence that are relevant to the trial. You can't be bringing in prejudices and foreknowledge! You have to be bringing just that, the intelligibility of what pertains to the context that you are given. That's what this implicit definition thing is doing in the context of mathematics and natural science.*

But Lonergan is mostly interested in it because it
illustrates the unique non-imaginable content that
intelligibility is!

Hilbert, by insisting on removing not only images, but words that have imaginative associations, forces us to recognize that our thinking includes a very distinct kind of content, namely intelligibility. So that's what Lonergan is interested in! Okay.

§4: Inverse Insights – Treated in a different order than occurs in the book *Insight*. Details of why is the diagonal of a square incommensurable with its side; Why is a surd a surd?

Inverse Insights. So notice that this is the thing that I'm taking out of order. Lonergan goes from his discussion of definition to Higher Viewpoints, and then to inverse insight. *And after thinking about it for a long time, I've come to the conclusion that the actual human order is reversed.*

> § 4 "Inverse Insights"
>
> **"Inverse insights presuppose a positive object that is presented by sense or represented by imagination. But while direct insight meets the spontaneous effort of intelligence to understand, inverse insight responds to a more subtle and critical attitude that distinguishes different degrees or levels or kinds of intelligibility."** (*CWL* 3, pp. 43-44).

Inverse insights presuppose a positive object that is presented by sense or imagination, which is the same as direct insight. So he's going to make — There are going to be three terms, and it can get a little confusing and it's going to take a little while to get used to how he is using them. Initially he is just talking about insights; and now he is talking about inverse insights; and therefore he is going to go back and modify the term 'insight' by talking about **direct insight**.

> So a direct insight is when you have an experience, and you ask a question about it, you use your imagination, and you come up with the insight that he says grasps the *immanent intelligibility* of the experience that you began with. It

answers the question What makes it be that way? What is it? Why is it that way? That's a direct insight.

An inverse insight inverts, or turns around the anticipation of your question. So just like a direct insight, it begins with some experience and the question that comes out of the experience. "**But while direct insight meets the spontaneous effort of intelligence to understand, inverse insight responds to a more subtle and critical attitude that distinguishes different degrees or levels or kinds of intelligibility"** (*CWL* 3, p. 44). Now the implications of this are played out throughout the text. You encountered a little bit of it in chapter two, which we'll be talking about in detail next week.

His argument is that much of the beginning of modern science anticipated a certain kind of answer, a certain kind of intelligibility, and anticipated that that kind of intelligibility would give the exhaustive explanation of everything there is to know about the natural world, and indeed about the human world. But in the nineteenth century, some key inverse insights arose that called that radically into question, and gave rise to the statistical method.

So what he is doing in chapters two through four is making the argument that much of our attitude about the natural world and the human world is shaped by an orientation that has been radically called into question by a set of inverse insights. And that those inverse insights give us a very dramatically different picture of the natural world, a picture of the natural world which is not deterministic, which has room for the emergence of different kinds of entities, including the distinct difference that human beings are and human meaning is. So his emphasis here on inverse insight is for the sake of opening up many, many different kinds of issues as the book unfolds! *It's also going to have implications for his treatment of things like disorder, and absurdity, and meaninglessness, and evil*!

So he is planting it here, and he is giving it in the context of a couple of mathematical and physics examples. *He is doing it for the sake of appropriating inverse insight, because some inverse insights are really crucial for reversing assumptions, and making a fuller and deeper self-appropriation*. So "**inverse insight responds to a more subtle and critical attitude that distinguishes different degrees or levels or kinds of intelligibility."** (*CWL* 3, p. 44).

Now, I think in the first class I drew attention to the passage where Lonergan talks about the pure question, the pure wonderment that we have that issues in this flood of questions that begins almost as soon — well, begins before we actually are linguistic beings — Little children just ask endless questions! So that behind that asking of those particular questions is just this pure question. *But what happens of course is that our questioning in channeled and oriented and directed.*

In chapter two he is going to talk about *two fundamental ways in which our inquiry gets channeled and directed in very fruitful ways, but they're only partial ways*: what he calls

the classical heuristic structure,

and

the statistical heuristic structure.

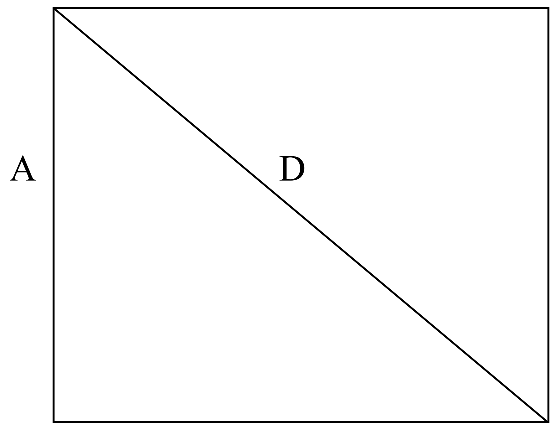
What he is getting at here in this remark about inverse insights is that there are all kinds of subtle ways in which our inquiry gets channeled. We don't just ask What is it? But we sometimes ask What is it? with an expectation that it ought to turn out to be a certain sort of answer! And inverse insights are correcting that overlay of expectations upon our pure inquiry.

So one of the examples he gives is this [referring to diagram on the next page]! What is the ratio of the diagonal of a square to its side? And *a ratio is a relationship. So we are in the area of explanatory thinking*! A ratio is a relationship — what the colon abbreviates is the word 'relationship'. So side A has a relationship to side D, and that symbol ':' symbolizes relationship. And number *m* has the number *n* for relationship. And the two colons say they 'are the same relationship'.

What is the ratio of the diagonal of a square to its side?

Ratio: A : D :: m : n

(m and n must be whole numbers)



Pythagorean Theorem

$$A^2 + A^2 = D^2$$

So an analogy or proportion says that this ratio, A : D, is the same as this ratio, $m : n$. The relationship, A : D, is the same as this relationship, $m : n$. A is to D as m is to n. And the question is:

What two numbers are the numbers of the ratio or the relationship between the side of a square and its diagonal?

This came out of the Pythagorean school of philosophy and mysticism and mathematics. There's a long history of this: there are some wonderful studies of this period, about all the incredible discoveries that the Pythagorean school made with this idea of relationships, this idea of ratio.

You may have heard at some point that the Pythagoreans thought that the world was composed of number. That's not exactly right! What the Pythagoreans *thought, for some pretty good reasons, was that the world was composed of relationships among numbers! And a ratio is a relationship of numbers*! Among other things, they discovered that the harmonics that were most pleasing, at least to the Hellenic ears, had these really nice numerical ratios to them. *So there was a big growth industry of all the things you could discover by asking the question, What ratios underpin, or explain, or are responsible for this phenomenon*? They discovered things about how weights are borne up, and all sorts of things!

But what might seem to be the simplest question of all, the simplest phenomenon of all, was one that didn't work! They had a way of — they figured out a way of calculating or discovering the number ratio that would answer their question, and they brought it to lots of other problems. But when they brought it to this particular problem, that technique didn't work! And they tried many other techniques! *And then they came up with the inverse insight*!

Now, before we move on to looking at the inverse insight, let's remember some Pythagorean Theorem: *the squares on the sides of a right triangle, when added together will give you the same area as the square on the side of the hypotenuse of that triangle*! So in this case [the above diagram], since the sides are equal, that means that $A^2 + A^2 = D^2$. Okay? That's pretty straightforward! So the Pythagoreans were saying to themselves:

"I keep trying, but I cannot find two numbers, *m* and *n*, that have a relationship to each other that is the same as the relationship of the diagonal to the side of the square. *Maybe there isn't such a one!" That's an inverse insight! "Maybe there isn't one!*" … Ah, but it could be wrong!

So the inverse insight — You can have inverse insights but they can be wrong! If you had gotten to a certain point in our first class when we were doing the classification of the letters that go below and above the line, and you said, "Maybe there's no rule!" that would be an inverse insight, but it turned out that it would have been an incorrect inverse insight!

So how do we know — how did they come to know that their inverse insight was correct?

What is the ratio of the diagonal of a square to its side?

"I keep trying, but I cannot find $m : n$"

"Maybe there is no such ratio." = *Inverse Insight*

But is it correct?

So this is the proof! Now, I'm sorry about this! This is a new version of PowerPoint! I don't know why it did this! I could not make it work line by line. So you get the whole thing twice! I tried and tried to get this sorted out so that I could give it to you line by line! It worked on lots of other slides, but for some reason I could not make this work on this slide! So we're going to have to kind of go through this in the jungle here! And stop me if there is something that is confusing you, because I want you to understand this!

But it's important that the proof is not the inverse insight. The proof is the way in which you know that you have a correct inverse insight! And this one happens to have a very, very significant set of implications.

So one way to know that you have an inverse insight is to suppose that the direct insight is correct. Because if you suppose that the direct insight is correct, and you find out that the direct insight can't be correct, then you know that your inverse insight is correct! This is called the method of indirect proof.

Okay, suppose then that there are two numbers that have the same relationship to one another as the relationship between the side and the diagonal! Okay. But let's pause a moment! Let's make sure that we've got the simplest two numbers. So maybe the numbers were 393 to 27. Well, those aren't the simplest ones, because they both share a factor of three. So I can actually take out the factor three from both and so reduce them to 131 to 9. So that's a simpler one to work with. So let's get the simplest one to work with!

What is the ratio of the diagonal of a square to its side?

"I keep trying, but I cannot find $m : n$"

"Maybe there is no such ratio." = *Inverse Insight*

But is it correct?

Proof: Suppose there is an $m : n :: A : D$.

Let's make sure it is the lowest one, so that m & n have no common factors, e.g., they are not both even numbers.

So let's take out all the common factors, so we get $m : n = p : q = A : D$.

But $A^2 + A^2 = D^2$, so that means $2A^2 = D^2$.

So this means that $D^2/A^2 = q^2/p^2 = 2$

or, $q^2 = 2p^2$.*

So q^2 must be even, and therefore q must be even.

So that means $q = 2r$.

And therefore $q^2 = (2r)^2 = 4r^2$.

That means, $4r^2 = 2p^2$, or $2r^2 = p^2$.

So p^2 must be even.

But, wait a minute, if p^2 is even, then p is even also.

But we already assumed that p and q cannot both be even.

So our assumption that there IS a ratio was wrong!!!

[*Pat's original version corrected from here on]

So we're going to stipulate that we're going to work, not with m and n which might happen to have some common factors. We're going to factor out all the common factors, and get to — and we're going to work with p and q instead. Okay? So we've gone from 393 and 27 to 131 and 9. *That means among other things that p and q can't both be even numbers, because we would have turned an even m and an even n into a p and a q that were not even. We would have cancelled the factors in two even numbers. Maybe one of them is even and the other one is not; or maybe neither of them is even; but they can't both be even, because we would have taken the factors of two out in getting to p and q.* So to sum up this point: having removed all the common factors, we get $m : n = p : q = \mathrm{A} : \mathrm{D}$.

But from the Pythagorean Theorem, we know that $\mathrm{A}^2 + \mathrm{A}^2$ is D^2. So that means that $2\mathrm{A}^2$ equals D^2. And now, if we form the ratio between D^2 and A^2, this is going to be two. In other words, divide both sides of the above equation, $2\mathrm{A}^2 = \mathrm{D}^2$, by A^2, so that you get $2 = \mathrm{D}^2/\mathrm{A}^2$, or in reverse,

$$\mathrm{D}^2/\mathrm{A}^2 = 2.$$

But we have assumed from the beginning of this argument that

$$\mathrm{A} : \mathrm{D} = p : q.$$

Therefore if $\mathrm{D}^2/\mathrm{A}^2 = 2$, then $q^2/p^2 = 2$. In other words, repeating this last point, that means that the ratio between q^2 and p^2 is also going to be two. If $\mathrm{D}^2/\mathrm{A}^2 = 2$, it will follow that

$$q^2/p^2 = 2.$$

Okay? Now, multiply both sides of this by p^2, and we get $q^2 = 2\,p^2$.

[Pat's version in the box above deduces $p^2 = 2q^2$, which is surely wrong here; and this error continues throughout his presentation in the box above from this point on. I make appropriate corrections below.]

Everybody on board so far? … Okay!

Or in other words, $q^2 = 2p^2$. Now that means of course that q^2 is an even number, because q^2 is equal to two times something. So it's an even number. Well, it turns out that the only way that a square can be an even number is if it's a multiple of four. So stop and think about that: the squares that are even numbers are 4, 16, 36, 64, etc. Okay! They're all multiples of four. Or in other words, q itself has to be an even number. If q^2 is even, then q itself has to be even. And that means it can be represented as two times some other number, let's say r. So that means

$$q = 2r.$$

So therefore q^2 is actually $(2r)^2$, because q is an even number, which means that it's $4r^2$.

$$q^2 = (2r)^2 = 4r^2.$$

But remember back here that q^2 is equal to $2p^2$. So $4r^2$ is equal to $2p^2$. And we just divide both sides by two, and we get $2r^2 = p^2$.

$$4r^2 = 2p^2, \text{ or } 2r^2 = p^2.$$

Which of course means that p^2 is even. But if p^2 is even, then p is even also. But wait a minute. *We said that both p and q couldn't be even, because that was how we started out! We already assumed that p and q cannot both be even.*

So if we assume there's a ratio, we're justified in assuming that we can find that ratio in a form in which not both of them are even. But if we assume that, we are led to the conclusion that they are both even. So there must not be a ratio of the side to the diagonal of the square! Our initial assumption that there is such a ratio was wrong!

Inverse Insights as opening up the possibility of:
§ 3. Higher Viewpoints: Led to redefining the idea of ratio, later the idea of number itself.
Inverse insight as the route to a higher viewpoint.

Now this discovery that there was no ratio of the side to the diagonal of a square caused considerable consternation in the period of Greek mathematics.

But it was a fundamental reversal of an expectation that the kind of intelligibility that would be the intelligibility to answer this problem would be the intelligibility of the relationship, the ratio, between two numbers.

Shortly following this discovery, there was a big development in Greek mathematics that led to a redefinition of the idea of a ratio. And in the twentieth century, that led to a redefinition of the idea of number.

And as Lonergan says, one of the things about inverse insights is, that like all insights, they occur in this ongoing, slow, human quest for understanding and knowledge. *And inverse insights, though they recognize that's not the right kind of intelligibility, while they close that door, they open a new door on to something else.* And what they open a window on to was a whole different more sophisticated higher viewpoint way of thinking about ratios and numbers.

§ 4 "Inverse Insights"

"**Inverse insights occur only in the context of far larger developments of human thought. A statement of their content has to call upon the later systems that positively exploited their negative contribution. The very success of such later systems tends to engender a routine that eliminates the more spontaneous anticipations of intelligence**." (*CWL* 3, p. 44).

So when you have a phenomenon like the square having a diagonal that can't be comprehended in terms of that limited kind of intelligibility, *what the human spirit does is to press onwards to seek other ways of understanding*. And that's why I think that the proper order for this is "inverse insight" first of all, and then "higher viewpoints" after that.

So Lonergan gives about three or four different instances of inverse insights. One has to do with the inverse insight into uniform motion. Up until the time of Galileo, it was assumed that there had to be some force that was making things continue in motion, and that if there was no force, then it would stop. *Then Galileo had the inverse insight that things don't need a force to continue them in motion.*

And the larger development that followed Galileo, particularly in Newton, was that what the force does is changes the nature of the motion! *And Newton's way of doing physics was a dramatically different way of doing physics than had ever been done before*. So he's giving some examples here of inverse insights that led to higher viewpoints, even though he didn't write the book that way, that is, in that order!

> **§3 "Higher Viewpoints"**
>
> **"Single insights occur either in isolation or in related fields. In the latter case, they combine, cluster, coalesce, into the mastery of a subject; they ground sets of definitions, postulates, deductions; they admit applications to enormous ranges of instances. But the matter does not end there.**
>
> **"Still further insights arise. The *shortcomings of the previous position* become recognized. New definitions and postulates are *devised*."** (*CWL* 3, pp. 37-38).

So among other things, an inverse insight into what's called the incommensurability of the diagonal and the side of the square opens up the question: *What does it mean to be a number*?

And again going back to my "Sesame Street" education with my kids … the Count! [Pat imitates brilliantly the Count from "Sesame Street", pointing to different imaginary points in the air above him:] "Let me count the baths! One! That's one bath! Two! There's two baths!" *So what's a number? A number is that which counts whole things*!

> **§3 "Higher Viewpoints"**
>
> **What is a number?**
>
> **What makes a number be a number?**
>
> **Pointing and counting?**

And essentially, that's what the Pythagoreans had been operating with. That everything could be construed on the basis of a relationship among counting numbers, where pointing is the operative way of determining what it means to have a number! Count the number of things in the room.

And Jean Piaget has done these really marvellous studies of how children learn how to count. Because if any of you have been around little kids, first of all they do [Pat gestures at imaginary objects, adopting a childlike sing-song voice:] "One, two, five, thirteen, seven, nineteen, twenty-four, six …" They can't get the rhythm right. When they get the rhythm right, then they have a hard time not leaving things out! So *there's a huge amount of insights that go into being able to master the notion of number as what we know by pointing and counting. But it turns out that doesn't exhaust the intelligibility of the universe*!

§3 "Higher Viewpoints"

What is a number?

What makes a number be a number?

Pointing and counting?

Adding, subtracting, multiplying and dividing, powers and roots, yielding another one of the same sort!

Implicit Definition.

What happened in the nineteenth century as, among other things, calculus forced a number of fundamental questions about what it means to be a number, is numbers became redefined not by what I can point to and count, but by their relationships to one another. A number is a number if you can add one to another and get another, subtract one from another and get another, multiply one by another and get another, divide one by another and get another.

So for example, this is where we end up with negative numbers. If number means what you can obtain by pointing and counting, there is no number which is the number which is what you get if you take five away from three! But *if to be a number is to be intrinsically related by these operations of adding and subtracting and multiplying and dividing, then negative numbers, what we call irrational roots, transcendental numbers, all become part of the way that we can understand the world that we encounter*.

§5 Empirical residue.

No *immanent* intelligibility.

Leaves open the possibility of a transcendent intelligibility

§5 "Empirical Residue"

"**Empirical residue that**

(1) consists in positive empirical data,

(2) is to be denied any immanent intelligibility of its own, and

(3) is connected with some compensating higher intelligibility of notable importance." (*CWL* 3, p. 50).

And last but not least I just want to talk about **empirical residue**. In giving an account of empirical residue Lonergan says "**it consists in positive empirical data**," that it "**is to be denied any immanent intelligibility of its own**." *I want to put the emphasis on the word 'immanent'*. Notice Lonergan does not say: "is to be denied any intelligibility of its own." And *this implicitly raises the question: immanent intelligibility and transcendent intelligibility*. What exactly he means by immanent intelligibility is what he is gradually opening up here. But for the moment, let's say that by immanent intelligibility he means *the intelligibility that people of common sense, and scientific people and artistic people come to understand*. So the empirical residue is to be denied any *immanent* intelligibility of its own. But it's "**connected with some compensating higher intelligibility of notable importance**." Which is to say that *the empirical residue opens up the possibility of intelligibilities that transcend whatever our expectations might be*! So he mentions that it's like inverse insight, but different from it in being more general.

Examples of multiple identical images of the witch moth.
What makes them different?
Intelligible differences vs. merely empirical differences.

So what does he mean by empirical residue? Here's our friend, the witch moth again!

[This picture differs from the one Pat uses!]

Now, look for a moment at the various elements, the sensible, visual elements, in that witch moth! As I said before, *it's the sort of thing that could occupy you for a considerable amount of time in a doctoral dissertation and a career. But I chose it because it's so incredibly fascinating*! Why are its — Why does it have that beautiful luminescent blue colouring to it which is not common among most moths? Why does it have these wave-like patterns on its wings? Why does it have these little wave-like fringes on the edges of its wings? Why, unlike some moths, do its wings come together when it's in a relaxed position, when some other moths have splits between these parts of the wings, and splits here [Pat uses the pointer]? If we could turn it over we could look at its thorax, and moths are different from butterflies in that they have very fat body features.

And we could ask just all kinds of things about this moth! Why is it the way it is? Why is it that data! What colour is it? What makes it look that way? *And it would lead us into all kinds of investigations of what environment it survives in, and* *what environment it might not do well in? All kinds of questions — There's just an endless number of features of its data that are there for us to ask questions about, and receive the answers.* To seek first of all descriptive answers, as I've just been doing. *I've been making you notice things you perhaps didn't notice at first, and then that leads us into all kinds of questions about how it relates to its environment, about how it relates to other members of its species, about how it relates to potential predators, and how it relates to its own prey, how it relates to ancestors from which it evolved! There's just an endless number of things about the data that you see before you that you can have insights into*!

[This picture differs from the one Pat uses!]

Okay. How is that picture different from the one you just saw? … … Now, how many moths are you seeing — Or let me put it this way: How many pictures of moths are you seeing right now?

Student: One only!

Pat: Okay. That's important! You're not seeing two right now, right?

[This picture differs from the one Pat uses!]

[This picture differs from the one Pat uses, flicking them from side to centre and back again!]

There is something empirical about the fact that they are not the same! … What's different about them? And just so you know, I copied them exactly.

[Laughter]

So there's no trick on this! Don't look for any colour, shape, little mark I put on it there, as I've been fooling you earlier in the class. But they're different, right? They're not the same! … Samantha?

Samantha: They're spatially different.

Pat: That's right. They're just — *This one is not appearing when and where that one is! So they're different in time and they're different in place*! What makes them different is that they're exactly the same arrays of colours and shapes, and yet they're different. *There's no immanent intelligible difference between them, because they're exactly the same data. And remember for Lonergan, our insights are into phantasms. And if we had different phantasms we could have different insights*.

Recall that slide I had a little bit before with all the different moths: there's lots of different things to be understood about *them* in their sensible differences. But here, *the only thing that is different about them is that they're in different times and different places. They completely lack any immanent intelligible differences; there are however differences: differences that are merely empirical. Now, that's what Lonergan means by the empirical residue*.

[This picture differs from the one Pat uses!]

You *are* seeing that one now. You *were* seeing that other one then, and *now you're seeing it again*!

[This picture differs from the one Pat uses!]

They *are* different! They come packaged — *Your experience comes spatialized and temporalized*! It's part of the experi — *It's part of the data. But it's part of the data that doesn't have an intrinsic intelligibility to it*! It's left over!

[These pictures differ from the ones Pat uses!]

Now, these pictures are different only in the respect that they appear in different places! That's the only thing that's different in those images. And yet there is a difference, one that doesn't have an immanent intelligibility to it! There is a merely empirical difference between these pictures. It's what he means by the empirical residue.

> *Now the importance about empirical residue is it's so elemental that it is open to all kinds of intelligibilities! All kinds of intelligibilities can be at times and places! All kinds of intelligibilities can differ only in their empirically residual qualities. It's this empirical residuality that makes possible, as he says, collaboration and generalization.*

People were asking me about generalization before. Because you can have very, very — In other words, *what goes along with this array of data and the other array of data on this moth* [*referring back to the moth pictures in differing places and times*] *is an immense number of insights. There are literally thousands and thousands of insights that would go into understanding everything you can experience about this moth. And it's possible that there might be another moth that has all those intelligibilities exactly the same, and yet it's different. That's possible because the empirical residuality admits of intelligibilities being at different times and in different places and in different individuals, without changing their intelligibility*!

Why did Lonergan include this elusive notion of "The Empirical Residue" in the first chapter?

Why did he choose to *end* the chapter with this difficult notion?

Possibly to point to the world of experience as radically underdetermined.

To suggest that the universe is dramatically open and full of unlimited possibilities.

Now, let me stop there and see if people have questions about that! … …

Why did Lonergan put an account of empirical residue here? Why did he end chapter one with this?

I think just as he spends time talking about *definition* to get us to begin to appropriate the dramatic and radical difference that intelligibility is as a content of an act of consciousness, just as he introduces us to *inverse insights* to make us aware of the subtle, unnoticed anticipations of what will count as an intelligent explanation in answer to our question, just as he told us about *higher viewpoints* to open up the possibility of different emergent intelligibilities in the world and in human existence, *I think he introduces the empirical residue here to give us a sense that, on the one hand, we are dealing with a world of experience, but on the other hand, the world of experience is radically underdetermined.*

Now, for it to be experiential, for it to be of sensible experience, it has to be in some place at some time in some individual, either continuously or discontinuously, but that's all!! And anything that the particularity of place and time and individuality and continuity is open to, that's a possibility in our universe. And that's radically and dramatically open!

And so I think that's why he puts it here!

Part of it is also, as he says, to give a sort of an underpinning and explanation of how it is that human beings, and scientists in particular, are capable of collaboration, and building upon the work of people who preceded them as also for later generations to build upon their work, and of how the human community is capable of collaboration and learning and generalization! But also to underline that it isn't just anything you imagine! That there is an experiential element and that it has to do with this empirically residual quality!

[End of Recording]