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An Interview with the Rev. Bernard Lonergan, S.J.
'Lonergan's Studies in Mathematics'
At Boston College on August 30, 1976, with Paul Manning

This is a transcription from a tape by Nicholas Graham, with assistance from Fr. Tom Daly, SJ.

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Q: This question goes back, Father, to something you were referring to a few moments ago about the courses you actually took in college. You mentioned analytic geometry.

A: Calculus.

Q: Calculus.

A: Advanced algebra.

Q: Advanced algebra. Any statistics or probability?

A: No. *Insight*, I have a very complex presentation of it …

Q: Probability?

A: Yes. The reason for it was I didn't know this theorem, I think it is deMoivre and somebody else [deMoivre-Laplace theorem, see p. 150 of McShane's *Randomness, Statistics and Emergence* – ed.], to the effect that if you take, say, the probability is *k*, if you take not only *k* but the adjacent probabilities, you get a curve that very quickly goes up to unity, asymptotically goes up to unity. And that is the way they handle this problem of making this infinite type of probability, using it empirically. I did all this going around to get it into the empirical side.

Q: But actually you never took a formal course in probability, it was just from your own readings and consultations with Fr. O'Connor.

A: Yes, I taught at the Gregorian for twelve years, and there was a fellow there in the Social Institute who knew probability pretty well. [This could possibly be Fr. William McKenna, who taught a course on 'Elements of Statistics and

Mathematics,' see p. 102 of *Kalendarium* 1957-1958; or Fr Clemens Mertens, who taught a course on 'Statistics and Demography,' p. 99 of *Kalendarium* 1953-54 – Ed.]. I know something about the different types of distribution, or I did at that time.

Q: You have some references to groups and fields, but you never had a formal course in abstract algebra?

A: No.

Q: What about mathematical logic? I know you have given a course here at Boston College on mathematical logic?

A: Yes.

Q: There is a tape of it, I understand, up at Regis in Toronto.

A: Right.

Q: I haven't heard that tape yet, but did you ever take a course in mathematical logic, or is it again your own study?

A: I prepared that course from mathematical meetings, the *proceedings* of international meetings. There are three or four books like that at the Gregorian library. I got it from that. (See mimeographed edition of 'Mathematical Logic' LB 147 at Lonergan Centre, Toronto, where he refers to such books as: A. Church, *Introduction to Mathematical Logic*; J. Ladrière, *Les limitations internes des formalismes*; P. Suppes, *Introduction to Logic*. In conversation with Fr. Daly, late 1961, Lonergan remarked that his first introduction to mathematical logic had been through A.N. Priors book, *Formal Logic*. This latter book is also mentioned on p. 59 of transcript from tapes of institute . – Ed. 2014, See now vol. 18 in Collected Works, *Phenomenology and Logic*, part 1.]

The thing about mathematical logic is that it is straight positivism; it is not 'if A then B' but 'not A without B' – a juxtaposition. And that is what Russell's Logical Atomism is. There is Wittgenstein's remark: if any fact – whether it exists or not wouldn't make any difference to the rest of the world.

Q: The college that you took these courses at was in England?

A: Yes. It was at the Jesuit house of studies for philosophy and theology. And the math teacher was O'Hara, the man I spoke to you about. And I was in the math course for about two-and-a-half years, and he had his own methods. He would use a textbook only for the problems.

Q: That is interesting because as I mentioned to you, my committee chairman was particularly impressed by the amount of mathematic you have in *Insight*, and not only the amount but also the degree of it. There are some pretty advanced mathematics there, at least that was our feeling. Would you have a favorite branch of mathematics?

A: I have been away from that for so long.

Q: The reason I ask that is that there is so much probability and statistics in the latter [sic] part of the book, and yet I had a feeling that you probably had a special liking for Euclidean geometry; you cite that often.

A: Well, it is a very interesting thing, you see, because Hilbert – The trouble with Euclidean geometry is that it has unacknowledged insights. And Hilbert got around it by his implicit definitions, so you have no images, and consequently no possibility of unacknowledged insights. I remember asking O'Connor once, I said, How can you tell it is Euclidean geometry? He said, You have to be a very good geometer!

My interest in mathematics is: you have insights in mathematics that are very sharply defined. You have insights in physics, and it is growing intelligence. It is intelligence on the move. When you get something in maths, well, it freezes it, if you get it right. Physics keeps on moving. Common sense is accumulating insights, insights that are not formulated and that are apt to mix with common nonsense, you have the surd coming in. So I had to start from maths and get the idea of insight clear and with exact examples. Then I went on to physics, the development of understanding; there is a circular flow: phantasm, understanding, formulation, checking. And if it doesn't click, then you get another insight. It builds up. You have this empirical cycle in the empirical sciences. You have inverse insight to understand common sense. Inverse insight is when the point is that there is no point. And it is significant in maths, like with the Greek's incommensurables, the modern surds. It is significant, and the root of minus one, i, all this. And they open up a new field, these inverse insights. When they discovered that velocity was just the same as being at rest, what it means is that velocity is something you don't need a cause for, you don't ask why it is moving or why it is accelerating. And that makes mechanics terrifically compact. It was an inverse insight. That is the first law of motion. Well, common nonsense – to understand the common sense you have to make allowance for the common nonsense.

In my book *Method in Theology* I do into interpretation and history, and they are further stages. It is an entirely different game to natural science, and you get into constitutive meaning, the meaning that is your life and which is realized in your living. Your living and similarly for society. The meanings of society are the meanings entertained that are effective in the society. So there is a lot of stuff there on meaning. But my interest has always been: how do you do it, what are you doing? What are doing when you are knowing? As I said in my letter, I'm not much of a mathematician. I can do this other stuff. I can see where insights are coming in, and so on.

Q: You obviously admire mathematics and mathematicians. I remember you wrote early in that collection of works that a mathematician has perfect insight, and that is a quote. Do you think it would have been possible to write *Insight* without using all the math that you did make use of? I ask this questions because David Tracy in his *Achievement of Bernard Lonergan* devotes practically no space to math; he has three brief references to mathematics. Do you think you could have written *Insight* without using all the mathematics you did use?

A: There is a man here who is trying to get an introduction to *Insight* through literature. He is Joe Flanagan, chairman of philosophy. And he did his degree, his doctorate, on *Insight* at Fordham. He is not a mathematician. He wants another way of handling it. And he is very good at getting money from foundations, and so on. He has a 'Perspectives' course in philosophy, and it really is humming, you know. He gets the grants and brings the best in the field here to teach his teachers, and he has more or less the pick of the undergraduates.

I'll tell people that are reading *Insight*, I'll say, Try and get the insights, but if you don't get them, keep going.

Q: Skip over the math if there is problem?

A: Yes.

Q: That is one of the questions I was going to ask. A lot of seminarians, for example, I understand from Fr. Liddy, have trouble getting through those examples.

A: If you get one insight clear and begin to see its significance, well you are just moved, pulled right out of all nonsense in modern philosophy. They didn't know about it. There was a man teaching at the Gregorian, teaching cosmology, Hoenen, a Dutchman, and he had learnt his physics from Lorentz, the Einstein-Lorentz transformation. And he was writing articles in the 30s in the *Gregorianum* on more or less geometrical knowledge, mathematical knowledge. And he claimed that he not only extracted the term from the phantasm but also the nexus and the proof of that was the Moebius strip. You cut it down, and you see the way things are bent, they are looped together, you see. And you know that you couldn't do that again without getting the same result, universalization follows. But you see the nexus, that's what happens when you do it. And he traced this back and he felt that Cajetan knew it, and probably Thomas. But for me his formulation of it was Scotist. It is Scotus who talks about terms and nexus. Thomas wanted to do – you abstract the *species*. And what is the *species*? It is the determinant of what you are going to understand. And when you express it, terms and relations emerge.

Well, I knew about Hoenen, you see, but I also knew about understanding. In philosophy I had no use whatsoever for all this talk about universals. A razor blade cuts anybody's beard, it is universal. So when I finished my London degree I went to see the prefect of studies for the philosophers. And I said, I've done this in London, so which should I concentrate on? He said, well, you might take into account that your superiors may want you to teach philosophy or theology. And I said, Oh, there is no danger of that; I'm a nominalist. And he said, Well nobody remains a nominalist very long. So when I was teaching I got hold of (his name slips me) but he published a book on Plato's myths in 1905 and *Plato's Doctrine of Ideas* in 1909, an Oxford Don [J.A. Stewart, see *A Second Collection*, p. 264 – Ed.] I was reading him, and he said, one of Plato's ideas is like the Cartesian definition of a circle, the Cartesian formula for the circle, an act of understanding! And then I discovered that Augustine never talked about universals, he is always talking about *intelligere*. And I discovered, perhaps not then, it was later on when I was doing the *verbum* articles, you get the same thing in Aristotle. He has expressions in the *De anima* and in the seventh book of the *Metaphysics*: 'What is it?' 'What does that mean?' 'Why is this that?' 'What is an eclipse?' It is 'Why is the moon thus darkened?' and so on and so forth. So I want to work on these ideas. My doctoral work was on operative grace in St. Thomas. And then about 1944 I started doing, working on Thomas on *verbum*. And when that was done I was all set to pull out of the medieval milieu, which I did in *Insight*. But doing that work in Thomas, it clarified a lot of things. You have the same schematism in *Insight* that you have in Thomas.

Q: But you wouldn't consider the math part of *Insight* really integral to the development? Helpful but not integral?

A: Well, no. The maths, you see, there's the maths in the physics, you can't do physics without maths. You are using mathematical ideas all the time. The people who try to give people an approximation of what is meant by acceleration, well it is just *obscurum*, it isn't intelligent. If you know what a second derivative is, well, that is crystal clear. O'Connor, at one time, wanted to give a course in maths at Loyola. It was more or less a gentleman's course in maths, the ideas in mathematics without the expertise that you have to have to do maths. Well, they didn't understand what he was trying to do, you know.

Q: You often use the example of Archimedes' *Eureka* in *Insight*. In fact, the second time I read it, I kept thinking of Descartes, and early in *Insight* you do indicate a kind of debt to Descartes. It seemed to me that just as Descartes had been impressed by the results of mathematical method, you had also been impressed. Would it be an oversimplification to say that both Descartes and you basically desired to introduce the method of mathematics and therefore its fruitfulness into philosophy?

A: I wanted to generalize the intelligence of mathematics.

Q: Could you explain that?

A: The first chapter. I am wanting people to understand, to repeat in themselves the acts of understanding that mathematicians have made and become familiar with those exercises of intelligence. Then go into other fields and find out what the differences are. I have already spoken of the difference between physics and maths. And the difference between physics and common sense is another step. Both maths and physics formulate, common sense doesn't, you know! My brother was once in [Western? – ed.] Canada and marveling (my younger brother), marveling at the way the Indian guide was able to find his way through the woods, and he was asking this fellow, well now, supposing you were following a buck for two days and you finally shot him, how would you know which way to go to get back to camp? And he said, 'You know.' So my brother would change the question, and the answer was always, 'You know.' And finally he said one time, 'Well, I know the way the streams are flowing.' Well, how do you know whether to go up or down? And the Indian would answer, 'You know.' Well, supposing you go down and you come to a branch, which way would you go? 'You know.' But they have this thorough understanding of the animals and everything that happens. There was, I think it was Edmund Wilson, an article in the *New Yorker*, and he was quite interested in the Iroquois. About 1860 they built a railway bridge across the St Lawrence River near Montreal, Victoria Bridge, and it was high steel. And the Iroquois, who lived nearby they took to it like fish to water, and they are all over the country at the present time; wherever there is high steel going on they are there. And they walk along the beams without the slightest bit of acrophobia, and so on. And one of them had risen to the stature of a supervisor in the steel construction, and Wilson was talking to him about his life and all the rest of it. And finally, the fellow said to him, I probably would be happier if I'd stayed with the animals. That's their ecology, their environment. And the Indians in the West, they were horrified, scandalized, dumbfounded when they saw the white man killing off buffalo they didn't intend to eat. It is something sacred for them, and God for them is the lord of the animals.

So you see my strategy there? In human knowledge the key thing is insight, the key idea is insight. That's what takes you out of the sensitive sphere, you get beyond it. It is what answers the question, enables you to answer the question. And it leads to the formulation, you have to check it, and that process of judgment comes out on top. And if you get hold of that you have an epistemology. And if you have cognitional theory, epistemology, then metaphysics comes third. And if you start out from the metaphysical you will never be able to make it critical, because all your fundamental notions will be in the metaphysics, and you will be just in a perpetual vicious circle. So I think math is of strategic significance in cognitional theory. I don't think a person has to be a technically finished mathematician, but get as much of it as you can. But understand what you are getting. There is a friend who is a professor of maths at the University of Toronto, and he was talking to me about Eric O'Connor and he said, Is he clear! And Eric once said to me, you know if I hadn't stopped and asked myself what on earth are you doing I'd have never got anywhere. But he and Professor Williams at McGill founded the Canadian Mathematical Society, for twenty-five years he was the secretary of it. Every second summer, he would bring three or four top mathematicians from Europe, and one year they had a man from India, and one year they had the rector of the University of Leningrad, and Eric would hobnob with them, but it was for university professors in Canada. It was four seminars running. We had people from Bourbaki, and so on. This fellow was doing his doctorate, the fellow I mentioned before about Eric being clear [the person referred to is probably P.J. Leah – Ed.], and I forget the name of the man from the Bourbaki but he was asking him, Now if you had this problem what would you do? And he answered, First I'd do this. And this fellow who was quite a mathematician felt stupid as hell. And then I'd do this, and so on. It took him out of a block, you know. But you have to spend your life at it, you know, to move into that field.

Q: While reading through your mathematical examples, especially in *Insight* but there are some, for example in *Verbum* also, I've been on the lookout for indications as to your preference if any among the various schools of the philosophy of mathematics. Intuitionism and formalism primarily, but there are other things like Logicism and Nominalism, you referred to philosophical nominalism before. In the book *Spirit as Inquiry* Novak says you are not an intuitionist philosopher. There are times when I detect an intuitionist bent, for example, your emphasis on insight. And in that short essay, 'In Appreciation: From a Mathematician' in *Spirit as Inquiry*, I guess it was by Fr. O'Connor, he summarizes a proof that you gave that there are infinite, many prime numbers, and he said it was like your own proof, like it was different from the traditional proof The traditional proof is indirect, it is a *reductio ad absurdum*, and you are not doing it that way.

A: I think Eric didn't remember me properly. What I was proving was that there was no fraction, proper or improper, that was equal to the square root of two, and it was by a *reductio ad absurdum*. Let root 2 equal *p* over *q*, then 2 is equal to *p* squared over *q* squared, and consequently 2*q* squared is equal to *p* squared, and therefore *p* has to be an even number. So we can replace *p* by two *r* and then you get four *r squared is equal to 2* q squared, and then you have a two on the other side, you see, and you can go on to infinity. Now, the thing was I forgot to mention that *p* and *q* had to be reduced to [primes, see *Insight* 21 – ed.] And I put this in, well you can repeat this to infinity – saving the day.

Q: Oh, that was the original notion?

A: Yes.

Q: But do you get caught up with that dispute among the philosophers?

A: I've looked at it a bit. I imagine that what is true is that this Intuitionist school, they want to reject the use of the excluded middle. Because really you are not constructing anything when you do it that way, and as someone said, and I think it is perhaps true, that if with their rejection of the excluded middle they were able to replace all the original work done in the 19th century on their basis, no one would have had any objection to it. But we need a lot of brilliant people to replace that, to put 19th-century maths on this other basis.

Q: And certain things collapse as a result of their not accepting the role of …

A: The excluded middle Yes. In other words, they have been done on that other basis, and it can be logically valid, but it isn't creative mathematics.

Q: Is it lacking the insight?

A: Yes. It is based on logic and not on insight. Well, logic. As Descartes said, I'm not talking about animals, but no *man* ever made a mistake in logic. And really this logic they have is a very cheapskate type of logic It is intricate as blazes but it is not intelligent, it is positivism. I remember at one of these international gatherings someone got up and said, what we need today is more Euclids who will create. And he was talking about, you know, the work logicians can do, like reveal isomorphisms between quite disparate fields. And he said, unless you had these original people, and he gave names, these people would have nothing to systematize. And what we need are people like Euclid, who think imaginatively and creatively. Now, of course, when you start using infinite dimensions you know you are right beyond the imagination, and you need the logic, the formal logic, once you get into advanced stuff.

Q: If St. Thomas was alive today, what do you think he would think about this Intuitionist school?

A: Well, Thomas, I know, knew about insight. He says too many things for it to be possible [that he didn't know – ed.] but he never thematized it. He used it, he knew it, but he never thematized it.

Q: There is a nominalist school among the philosophers of mathematics too that say we are just playing games with names, symbols. You were kidding before about being a nominalist, I guess in the medieval sense versus universals and that whole controversy. Do you have any feeling about this nominalist viewpoint in mathematics?

A: Well, it is just stupid. If you are stupid you can't say anything else. He is probably quite intelligent but never thematized his own intelligence. That is what *Insight* is about, and being able to thematize your own intelligence is something that enables you – you are into method. In other words, hour intelligence becomes a method.

Q: To use one of your examples, I could see how geometric insight can lead to the extension of the number system, for example, from the rationals to the irrationals. I can understand the geometric insight but I couldn't quite understand what you meant by the algebraic insight as you go from the smaller set to the larger set, as an insight. I could see geometrically saying there are more points there than we have accounted for, and there are numbers corresponding to those points, and they are certainly not rational numbers, so it must be something else. I don't quite see that extension algebraically.

A: Well, write down *x* squared equals minus one. In other words, the idea of the group really is the idea. The idea of the group is that if you can get to one place you can get back again. If you can write *x* squared is equal to minus one then you can write *x* is equal to the square root of minus one, 'plus or minus.'

Q: OK, that's the insight that would lead to the defining of the square root of minus one?

A: Yes. In other words …

Q: It is a kind of inverse insight then?

A: Well, it is the overcoming, it is a method of generalization. You start off with your natural numbers, and then you start doing subtraction and subtracting the bigger from the smaller, and you get to negative numbers, and you have to put a zero in between. Then you go on to multiplication and division, and you come across repeating decimals, and you move on to powers and roots and lo and behold you have things that you can't take a square root of unless you have irrationals, complex numbers. And if you want to make those operations universal you will have to go into the complex numbers.

Q: OK, thank you for that clarification. I can see the insight more readily geometrically.

A: No. It was group theory I was thinking of, I think.

Q: I know you are really into the theology now, and you have been for the past ears How crucial do you think *Insight* is in the construction of your entire philosophical-theological system? Basic to the whole thing?

A: It is a necessary ingredient, a necessary tool. The problems people have in theology is first of all that they haven't done any philosophy that's worth shaking a stick at. And you can't teach them anything because they haven't done any philosophy. And they have problems in theology and they haven't got the tool for handling it. Take the celebrated dispute between Jesuits and Dominicans on efficacious and sufficient grace Well, what does efficacious grace mean? It means a grace you don't refuse and not refusing is not doing something irrational. And sufficient grace is grace which you do refuse, the irrational comes into both terms. Thomas never spoke of either efficacious or sufficient grace; he knew about them. He had enough sense not to introduce the irrational in defining his problems. And when the irrational is introduced in defining the problems then the only thing to do is to keep the rational and the irrational separate.

It comes in in a lot of ways. The process from the New Testament to Nicea. First of all, you have the influence of Stoic philosophy. Anything that is real is a body, and Tertullian will say that, not a body like ours but a body that's real. The man who introduced spirituality, strict spirituality, was Origen. But his spirituality was from Middle Platonism, the spirituality of the ideas and then, how do you distinguish the Father and the Son? Well, the Son is truth itself but the Father is something far more than truth, far better. The Son is Logos itself and the Father is something far better. The Father is God, God himself, *Autos Ho Theos*. The Son is *Theos*, that's God, he is by participation in God. You have a subordinationism there. And it is out of Origenism that Arianism comes. What is meant by *homoousios*? You have it in the old Preface of the Trinity I think it is still in too. *Quod enim de tua Gloria revelante te credimus, hoc de Filio tuo, hoc de Spiritu Sancto, sine differentia discretionis sentimus*. Athanasius's formulation: *Eadem de Filio quae de Patre dicuntur, except Patris nomine*. He was talking about realities and the same predicates, the only difference was the relations.

Q: Is there a little bit of that in the theological air right now?

A: No. They just have a blank. And that was part of the great benefit of the 60s, the great leap forward by ignorant youth.

Q: I haven't read your theological works, but if I go ahead with this dissertation I will read them for the mathematics. Are there many examples from mathematics?

A: Well, in my second volume of my thing on the Trinity [*De Deo Trino* II. *Pars Systematica*] there is the use of symbolic logic. It puts the objection against the Trinity (p. 142): *Quae sunt eadem uni tertio sunt eadem inter se*. But Father, relation *paternitas*, and *relatio Filiatio* are identical with the divine essence, therefore they have to be identical with one another, and you have no real distinction between Father and Son. And the answer is *Quae uni tertio sunt eadem, re et ratione, sunt eadem inter se, concedo; re et non ratione, nego*.

Q: This is St Thomas saying this or yourself?

A: It is myself but it is Billot too and so on. I forget just how I handle it.

Q: Will there be something for me to …

A: Well, it is the last page in the book, and it is an appendix, it was put in in the second edition or something like that.

Q: I have just one more question, Father. I have the impression that Thomas is your favorite philosopher from the past, correct me if I am wrong on that, but who would be your favorite mathematician who most embodies the use of insight?

A: They all do, but they don't know it, they wouldn't be so keen on logic if they did. The advantage of logic is that it is an example of thematization, but it is thematization of the proposition. And that is a good thing. You see this thing of Athanasius *Eadem de Filio quae de Patre dicuntur, except Patris nomine*, it is reflecting on the proposition he can find in the Bible. And *homoousios* doesn't mean metaphysics. It is the reflective use of propositions. It is moving to a second level. It is operating on propositions. Piaget has this about operating on propositions, and it is just that. A lot of people are against *homoousios* because they think it is metaphysics. It is just logical analysis. Because once you start to analyze you are using propositions as objects. And according to Piaget, a boy can do that when he is twelve years old -- and girls I don't know. Did you see the thing of Buchwald, he gave an address at Emerson College, to eleven men and nineteen persons.

Q: Is that Art Buchwald?

A: Yes. And another repeated remark was that he worshiped the quicksand that Jimmy Carter was walking on. He is an incisive gentlemen. Really, I don't know enough about math to have an opinion on that. I liked mathematics when I was in elementary school because [you knew what you had to do and could get an answer. See p. 2, *Caring about Meaning: Patterns in the Life of Bernard Lonergan* – ed.]