917 A&B June 21, 1977 Second discussion (this will be 919 on the recording, which should be changed to 917)

Question 1: In what way are the goals of mathematics and art related?

**Lonergan**: This requires a lot of speculation. Mathematics may be regarded as the exploration of all possible scientific theories, i.e., theories in natural science or subjects treated as though they were in natural science. So, for example, analytic geometry and calculus made Newtonian theory possible. Riemannian geometry made Einsteinian relativity possible. Matrix algebra<sup>1</sup> made Heisenberg's formulation of quantum theory possible. So there have been different mathematical developments. Descartes introduced analytic geometry, in which you don't work from pictures, but deal with algebraic equations, doing geometry by equations. By calculus you are able to deal with velocities and accelerations and prove theorems such that if you have two bodies gravitating towards each other, the relative movement will be in conic sections. For example, an ellipse is a conic section. Conic section is what you get by cutting a cone or two cones that are head on. If you cut parallel to a leading edge you get a parabola, and if you cut more or less perpendicular to the main axis you get a circle, and if you cut at a slant and you get an ellipse, and if you cut down through two cones and you get a hyperbola, and if you cut through the center, where they intersect, you get two straight lines. That's the conic sections. The Greeks developed the geometry of conic sections. In Cartesian method you put it in terms of mathematics; add the calculus, and you are able to deal with what Newton called fluctions. So the mathematics makes scientific theory possible. It explores the world of possible scientific theories.

Similarly, the work of artists may be regarded as the exploration of man in his world, of differences of the worlds in which men might live, of differences of the men living in the worlds, where 'world' means what is mediated by meaning and motivated by value, a human world: what man makes of the world given by nature and again where men are constituted by the meanings that inform and the values that motivate their lives. All that material of meaning, the kind of man you want to be, the kind of motives that will make you that sort of man, the kind of community in which you want to live: all that can be explored, and it is explored artistically. *Brave New World, Utopia, Das Kapital*, and so on. There can be philosophic things too. You have a case where possibilities are being explored, possibilities in lifestyle in art, possibilities in science by mathematics.

Further, in both the constructions of mathematicians and the constructions of artists there is a basic freedom. For both explore not actualities which would tie them down to the one real world but possibility, the range of possibilities. It is [done] very thoroughly in mathematics. And there is not only the basic freedom, but also a controlling criterion. This criterion is aesthetic. It is the clarity, simplicity, elegance, comprehensiveness of a mathematical treatise that delights the mathematical mind and makes it prefer this presentation of the matter to another presentation which is not so clear, not so simple, not so elegant, and not so comprehensive or any one of the four defects; and the criterion is aesthetic. It has been remarked of Einstein's general relativity that it appeals more to the aesthetics of a mathematician than to the hard-headed scientist,

<sup>1 &#</sup>x27;Matrix algebra' is not what Lonergan said. He mentioned the name of a mathematician, but I found it impossible to decipher. I am grateful to Patrick Byrne for supplying an accurate rendition of his meaning.

because its verification is second-order magnitude, not big magnitude such as came out of or is established by special relativity. Similarly, in each of the arts there is a certain ?, slow or rapid, very rapid in Picasso, who can start anywhere, that gets things right. And Collingwood, in his *Principles of Art*, a magnificent work – it is brilliant reading. the way he contrasts art and what it not art, and then the elements in art, and then what is the aesthetic moment. Is it the man drawing the line? Oh no. It is when he rubs it out and draws another one in its place, gets things right.

**Question 2**: Would you comment on the relation between the empirical residue in math and in art?

**Lonergan**: The empirical residue in mathematics is the material which the mathematician distinguishes, orders, constructs, relates. For example, sets, discontinuous sets and continuous sets and all you can say about them; pretty well everything is included there; and then relations between sets, one to one grouping and curve mapping and so on. The group is something smaller than the set, much more restricted. But the fundamental characteristic of the group is that from any element you can go to another element and back again. If you can take the square root of one, you can take the square root of minus one too. Mathematics is content to deal with its empirical residue in defined relations. It sets up relations in this empirical residue, of all sorts. Art is never content with the empirical residue as its material. It wants what Aristotle would call qualities: colors, sounds, shapes, feelings, presence, and so on, and it is in that that it is exploring the human world. On the differentiation of the arts and what's peculiar to painting and music, statuary, architecture, see Suzanne Langer's *Feeling and Form*.

**Question 3**: Would you comment on the construction of metaphor in relation to abstraction from phantasm and the underlying rhythms of nature and psyche?

**Lonergan**: I don't think my answer has much on the underlying rhythms. Abstraction from phantasm is consequent to insight into phantasm. If you have no insight you have nothing to abstract except the fact that you have a question to which you haven't yet got an answer. And from that you can get a heuristic concept. To talk about abstraction and to forget insight has been the mark of decadent Scholasticism since the beginning of the fourteenth century. To see how long it has lasted you can see *The Modern Schoolman* for 1946 and the way they treated the first of my *Verbum* articles.

Alternatively, it has been the aftermath of the Augustinian/Aristotelian controversy at the close of the thirteenth century with a succession of books with titles like *A Correction of Brother Thomas* or *A Set of Corrections of Brother Thomas*; followed by or answered by *A Correction of A Set of Corrections of the Corruption of the Doctrine of Brother Thomas*, followed by, etc. It was a possible infinite series! It is insight that explains metaphor, for insight is constructive, the source of new initiatives. while speech also is constructive and metaphor when it is fresh and alive is a new initiative in speech. On a fundamental characteristic of speech that appeals to me an awful lot, see George Steiner, *After Babel*, Oxford University Press, 1975, paperback 1976. It is a long and rich reflection on the multiplicity of languages and the possibility of translation from one language to another. He doesn't know whether his mother tongue is English, French, or German; they all seem to have been with him since infancy. So he knows a lot about languages. He inclines to explaining the multiplicity of languages by supposing that really we all make up

our own sentences out of the available materials, that the understanding that each of us has of what others say is approximate, that metaphor and other devices are discoveries for new uses for old words. They are what Horace in the *Ars Poetica*, the last of his epistles, called a *callida iunctura*: callida, not calida, a witty, bright, smart combination, not a hot joint. And so that more or less locates where metaphor is. Don't think of words as well-defined nuggets. Look up any dictionary, and you'll find all sorts of meanings for any word, and in a historical dictionary you will find the meanings of the word changing, and so on. It is all very fluid. Nineteenth-century English and twentieth-century English are quite different, and you would be obviously a Rip van Winkle if you started talking that way to a present audience.

Question 4: What role does art play in the orientation of subjects towards conversions?

**Lonergan**: Well, insofar as we were correct in conceiving art as an exploration of possible worlds in which men might live and the possible ways in which men might live and do and make, it also reveals the possibilities of pulling out of established routines and starting afresh in a new lifestyle. And one of the ways of starting afresh in a new lifestyle is a conversion.

**Question 5**: In *Method* you stress theology's task of recovering four centuries of differentiations of consciousness, and in 'Theology in Its New Context' you refer explicitly to the period around 1680. Would you comment further on this task?

**Lonergan**: Gladly! The basic problem arises from the destruction of the achievement of the twelfth and thirteenth centuries. Then theology had a method. In its endless questions it was devoted to the logical ideal of clarity in its terms, coherence in its propositions, rigor in its proofs or else explicit acknowledgment that its arguments were only probable. But method is more than being logical, for it guides ongoing inquiry and investigation. Now, in the earlier period there was the recovery of sources, their distribution, their translation, the study of them facilitated by commentaries, the results of commentaries collected and collated in books of sentences. The logical ideal of clarity, coherence, and rigor was applied to this amorphous traditional mass with the technique of the quaestio, the Videtur quod non and Sed contra est. You had authorities on both sides of every contradiction, and you listed them, along with arguments from scripture and arguments from reason. There followed what is called the body of the article, the body of the quaestio, a general statement of principles of solution, and then after the body of the article the application of those general principles to each one of the alleged sources. To this was added the strategic move towards securing a coherent (what the Germans call) Begrifflichkeit, a set of basic concepts and theorems, and the need for that was the fact that every quaestio gave rise to solutions. But how do you get the many solutions to the many questions to be coherent with one another? Granted that each question would solve the incoherence of elements in the tradition, how do you make the solutions coherent with one another? You have to introduce some sort of system, and this was done insofar as Aristotle was adopted and adapted to Christian needs.

Now in this early period, in which ongoing research was combined with logical reflection and clarification, there was perpetual advance. If you want proof of it, take Aquinas's commentary on the *Sentences* of Peter Lombard, and compare what Aquinas is talking about with what Lombard was talking about. If you want to relate the two, you have to do the intermediate history of a hundred years and the changes that went forward during that period and how the treatment of questions changed. There is a hundred years of advance between the two.

Moreover, the logic, the simply logical ideal to ? what is static: if all your terms are clear and all your propositions coherent and all your proofs rigorous, where can you go? You are already there. But if you are dealing with an ever changing, ever increasing mass of material that you are trying to reconcile and coherently present and new ideas coming on towards solutions, in other words, when development is going on, logic serves more as a solvent than as a source of fixity. It reveals how poor your arguments really are, and that the terms you thought were clear are really not so clear and that your coherent propositions, well, really, are they coherent? and so on. Logic can work either way, but for it not to be a principle of fixity you have to have the research, the empirical research, the ongoing research coming in too.

However, the introduction of Aristotle did lead to the Augustianian/Aristotelian controversy, which we have already mentioned. Partly, because not all Aristotelians were as faithful to Christ and his Church as was Aquinas, partly because what may be called something like group rivalry reinforced the conviction that the doctrines of the pagan philosopher could not be combined with the doctrines of the medieval church. There was a real hang-up on that issue. The upshot of the intensive, drawn-out controversy was that theology lost its concern for research, that it lost the balance of method which combines ongoing research with logical clarification, that it overemphasized logic and indeed overemphasized the brilliant but mistaken view of science found in Aristotle's *Posterior Analytics*. Modern science is not an incarnation of Aristotle's *Posterior Analytics*. Christian truth certainly is not a matter of necessary truths, in which predicates pertain to subjects universally, necessarily, and eternally. As Lessing said, eternal truths cannot be had from contingent facts, and the Christian revelation is a contingent fact; but into that trap theology fell, and the result was first skepticism and then decadence in the fourteenth and fifteenth centuries.

I have five elements in a recovery. The first element in a recovery is the discovery that besides intelligibilities that are necessities, there also are intelligibilities that are not necessities but only verified possibilities. Modern science deals with verifiable possibilities, and modern mathematics probably deals with theoretic possibilities under aesthetic control. But, if I remember correctly, in Pius XII's 'Humani generis' he remarks that polygenism has not been demonstrated. The Aristotelian ideal of science demonstrates. This is supposed to be the criterion in modern science; it is not. The old habits of thought are still there, and they queer the pitch.

The second element in a recovery is the discovery of the quite distinct procedures of hermeneutics and history. What natural science does is one thing, and what hermeneutics and history do is something quite different. They are dealing with a purely human world, and it is not a world such as the pre-human world. So we have two new differentiations of consciousness: modern science, which deals with verifiable possibilities, and hermeneutics and history, which deal with human meaning and human movements.

A third element is the discovery of a technique for introducing something like a methodical control over judgments of value. Theology cannot be value-free. Above all it is concerned with values.

A fourth element is something prior to metaphysics, something prior to epistemology, namely, a cognitional theory, an empirical cognitional theory. What de facto are we doing when we are coming to know? What are the operations that are performed – not what must be so, but what de facto is so? A cognitional theory that embraces in a single differentiated view such

diverse procedures as those of common sense, of mathematics, of natural science, of hermeneutics and history, and of value judgments: you need the lot.

A fifth element is working out an acceptable method of theology, and so beginning again where the thirteenth century left off.

Such is my brief comment on that. Oh, you want something about 1680. The period around 1680 is significant as the time when Catholic theology settled down into its post-Tridentine fortress mentality. It stressed certainty, doctrine, clarity. It replaced questions by theses, and the theses were to be expounded and defended. It has been a casualty of Vatican II.

Question 6: In what way does praxis involve emergent probability?

**Lonergan**: Praxis does not so much involve emergent probability as be involved in emergent probability. Emergent probability is a world view that results from the course of affairs as settled not only by natural laws but also by probabilities. It embraces the genesis of chemical elements, their distribution, the distribution of their combinations, or the emergence and distribution of their combinations. It embraces the evolution of plant and animal species. It provides the basis and background from which man emerges and in which he operates. But man's operation is not just a matter of natural law but also of intelligent originality. Man does not wait for significant constellations to emerge, but he figures them out and brings them about. So man takes over a partial direction of emergent probability itself. Human history deflects the course and hastens the pace of emergent probability, when things are on the move. But human cultures also stagnate. And this history itself is a product of the probabilities that have emerged, probabilities about insights, discoveries, cooperations, and so on.

**Question 7**: In what ways are the operations of the lower and higher quasi-operators within emergent probability? Are their operations beyond the immanent intelligibility of this universe?

**Lonergan**: No. They are within the immanent intelligibility. Emergent probability is a combination of natural laws, of probabilities, and of human initiatives. Operators and quasi-operators pertain to the hierarchic structure of many-leveled beings. How do you move, the movement from one level to the next: there is something there that brings it about.

Question 8: What kind of stand should political theology take on economic theory and practice?

**Lonergan**: The basic problem is the derailment of humanity initiated by realistic theories of state and society. On this topic and very abundant is Leo Strauss, *Natural Right and History*, and other books. These realistic theorists ask, 'What is the use of moral precepts that are very beautiful and quite ineffective? What the state needs is a way of getting things done, getting them done efficiently. What is wanted is not telling men to be good but controlling them, leading them on, by desire or alternatively by fear. It is a matter of a technique for controlling society more than a praxis in which human individuals and groups make their decisions and carry them out, live them. They went on to procedures they felt would be effective, the procedures of Machiavelli, the theories of Hobbes and Locke, and so on. Within this trough comes modern economics, which fundamentally searches for a technique that will control economic operations beneficently: the optimum, 'Everything will be fine,' under equilibrium theory.

Now, there is an opposite procedure. It conceives an economy as a set of objective interrelations that arise from the mere fact that the economy exists and is expanding or not expanding, and it studies those relations and from this it gets minimal precepts, the conditions of the possibility of the economy functioning. Your motorcar won't function properly if you insist on stepping on the brake every time you step on the accelerator. A motorcar is a simple machine and hasn't got a conscience, and the economy as a machine hasn't got a conscience, but it has a certain way in which it operates and other ways in which it doesn't operate. And the business cycle has been a long demonstration of the fact that the economists haven't got the economy by the tail by any manner of means.

So we want to analyze the matrix of economic relationships and derive from the analysis moral precepts that dictate the economic conduct, praxis, necessary for the proper functioning of the economy. The basic problem will be educational. And it will take a century or two. There will have to be formed a public opinion that conforms to the elementary requirements of economic public health, and what is more difficult, the public spirit that is willing to conform. Our problem arises from setting morality aside as inefficient. But there is no evidence that the 'efficient' are really more efficient.

Now, I have a note in red at the bottom of my page of questions, and it is to the effect that perhaps the general rubric for questions 9, 10, and 11, can be some kind of general introduction to the economic question for us. That's what I find more simple and perhaps more fruitful.<sup>2</sup>

Now, the first and enormous difficulty is that any scientific talk doesn't use ordinary language. It doesn't start from notions that you are already familiar with. Science moves from mere description, endless description such as in the old books on botany, which describe each type of flower in detail, to something explanatory, when you start introducing technical terms and theorems.

For example, chemistry leapt into explanation with Mendeleev's periodic table. It had a set of slots that covered all known elements and had empty spaces for elements yet to be discovered. It had recondite ways of determining atomic numbers and atomic weights in each of these elements. And the atomic weights and the atomic numbers were not something that was already familiar. The weights were familiar, they were a matter of weighing, but to discover the numbers required a table.

Now, a first requirement, in my view, is to get rid of a juridical notion of capital in terms of property, and replace it by a macroeconomic functional notion. Microeconomics deals with firms. How does the firm function, how does it survive, how does it advance? And so on. Questions that regard particular firms are microeconomic. Macroeconomics deals with the

<sup>2</sup> Questions 9, 10, and 11 as given to Lonergan read as follows. (9) During the five years ending in 1975, corporations retained a total of 180 billion dollars of undistributed profits (after taxes and dividends) and during those same five years, the net corporate debt increased 509 billion dollars. Would you comment critically on both the profits and the debt from the perspective of your own views on pure surplus income and the problems of debt-servicing? (10) Present economic theory requires a percentage of unemployment for the avoidance of inflation. Would you comment on this, on government's responsibility in the area of unemployment, and more generally on the extent of government's involvement in the economy? (11) What are the economic or other grounds for the exclusion of unions and corporate monopolies?

economic community as a whole, the independent sovereign state in abstraction from the others. We will go on to interaction afterwards, and we'll get how they function internally, the inner organism. And what is this macroeconomic functional notion of capital? It is the goods and services that promote maintenance, improvement, and growth, that is, the maintenance, improvement, and growth of this capital, but also of the services presupposed by the standard of living.

A second requirement is to get rid of a bookkeeper's notion of profit, the bottom line, what everyone means by profit. Well, you won't do anything in economics unless you deal with a different notion, replace it by a macroeconomic functional notion, namely, the part of total current income that results from the sale of goods and services that promote maintenance, improvement, and growth.

So capital and profit have the same functional notion. Total current income is equal to (writes on blackboard and says: that's a shorter notation because long phrases lead to confusion). Total current income is of two kinds: income derived from the saved, the expenditure on, maintenance, improvement, and growth, on the goods and services that provide maintenance, improvement, and growth; and another type of income that is equal to the expenditure on the standard of living, goods and services. There are other ideas of capital, of course, but you don't get this idea at all; you have capital whether they are consumer goods or expansion goods.

Now, another relationship, this I" and E" [part of what he drew on the blackboard]: the income from the production and supply of goods and service that are concerned with maintenance, improvement, and growth in contemporary industry. Some of that income is going to be spent for standard of living. So part of I" is going to flow into the next stage of E', and at the same time the I' is not only the I' of workers who spend all they earn but also of capitalists who make a profit. So part of I will cross over to the next round of E". You will have a crossover, and if they are equal there will be no problem, because if they are equal then the next round will be the same size as the preceding round. And you can keep on, as far as the money is concerned, doing the same volume of business as you have been doing in the past. That is the circulation, the circulation one way of goods and services and the other way of cash. Now, there are further complications which we need not go into. Lots of further questions can be asked, but we'll just make a few brief reflections.

This I" is the quantity of pure gravy turned out by the economy. That quantity of money, whether it is going to be spent on E' or E", provided that the crossover can be replaced, that quantity of money cannot be spent at the market for consumer goods and services, or if it is it will raise prices, it will merely cause an inflation, because the other quantity of money is sufficient, it is equal to the total sale value of current consumer goods and services. So there is a type of profit, and in what sense is it profit? It is money to be invested. Once a capitalist always a capitalist, and a bigger one. Moreover, what does maximizing profits in this sense mean? It means having as large a flow of goods and services for maintenance, improvement, expansion, as possible. The bigger it is, the bigger the gravy train. And maximizing the rate of profit, what does that mean? Well, it means maximizing I" and minimizing I', because the rate of profit is the ratio of I" over I" plus I'. So maximizing profits does not seem to be the key to economic optimum. But if profit is not only a motive but also a criterion, you begin to see the difficulties with our present setup. It is not profit start to decline, when the rate of profits starts to decline, then it is time to stop investing. When profit becomes the criterion, this I" is the size of

the acceleration of the economy. It is not making shoes but making shoe factories. And for every new shoe factory you get a new flow of shoes. You can't build shoe factories ad infinitum, and so on for all the rest of this type of thing; it is bound to have its ups and downs. And every time it does down, the rate of profit dips. But if you have monopolies, they will be sheltered, they can take the profit still. Where will they get it? Well, the marginal firms will go bankrupt. Of if they don't go bankrupt they will raise their prices to make ends meet, and you will have inflation. And between them being squeezed you get unemployment.

So that very briefly is an introduction to the ideas involved. The problem with the analysis that we have considered mainline economics is that it envisages a whole stationary state, and our economies are accelerating economies; they have taken off. There is a certain time when an economy can start accelerating, and once it does it keeps on going. The takeoff is the problem.

## Questions from the audience

**Question**: With regard to your response to question 5, you described the five points by which recovery takes place. Could you project a little bit more in terms of what you said about the possible discovery of techniques for a methodical control over values?

Lonergan: Dialectic and Foundations. Dialectic is a critique of the work of historians, exegetes, and their researchers. The critique allows for issues; it distinguishes issues that can be resolved by further research, interpretation, and history writing and other issues that come out of this that are due to the presence or absence of intellectual, moral, religious conversion in the historians, the exegetes, and the researchers. And the man doing Dialectic selects which he considers to be the converted and which the unconverted, and thereby he puts himself on the line. 'That's what you think conversion is,' the retort will be. The value judgments are being brought out into the open as much by the critic as by the original workers. That type of thing functions silently at the present time. And what comes out of it? Well, in Foundations a man puts himself again on the line, and he decides if he is going to agree with the critic or the criticized. But he will have certain alternatives presented to him by the Dialectic, the dialectical oppositions. In other words, we're bringing this question of value judgments from something that goes on tacitly, that is diffused rhetorically, that is a matter of group allegiance, peer pressures, and so on, and the idea is to get it out into the open in some way or other, at least to make a beginning toward the methodical approach towards the question of value judgments. Then there is consistency in these value judgments. By their fruits you shall know them. What happens with the people that accept this view? and so on. In other words, this question of value judgments is something a theologian can't burke. He has to face the problem of value judgments. Human scientists, if they are following the methods of the natural sciences, then they have to burke them, but a theologian can't take that route. Consequently he has to face them and bring them out into the open.

Now is my method going to do it? Another approach to it is dialogue, which is better, because favorable results are favored by the good sense of the participants and their own value judgments and what they would do themselves. So dialogue is a step beyond dialectic. Dialectic is an objective approach: A says this and B says that and C says the other. And there is a tendency in A to say this and a tendency n B to say that, and so on. But in the dialogue they are talking to one another. One says not that you are wrong, but 'I'm not too sure of that.'