Joistings **18**

The Field and Unified Field Theories; God and I.

Prologue

The present Joistings obviously relates to the manner in which Robert Doran uses the search for unified field theories in contemporary physics as an analogy for the search in for a fresh unity in contemporary systematic theology.[1] Following that lead, I came earlier to a different conclusion than he did regarding the sufficiency of what he calls the four-hypothesis[2] as a sort of axiomatic basis for such a 'front" to a new systematic theology. I claim that in a fuller context of understanding, the new view of finite Trinitarian participations grounds an adequate understanding of being and finitude, adequate in a way that parallels the adequacy of the hypothesis of "an unrestricted act of understanding"[3] in driving towards an answer to the question, "What, then, is being?"[4] In the context of the elementary book, *Molecules*, *Minding*, *Meaning*, I wrote sufficient to make this plausible. But it seems good to enlarge on the topic in the manner of a foundational push forward.

Yet there is another context to my present reflection. It is the context of the search for enlightenment that was the enterprise of the 117 ***Cantowers***, that decade-long million-word project that I interrupted at *Cantower 41.* The ***Cantowers*** to follow there were to reach into physics as a source of enlightenment climbing, and in particular I mention the three ***Cantowers*** due in March, April and May of 2007: ***Cantowers*** 60, 61,

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[1] Robert Doran, *What is Systematic Theology?*, University of Toronto Press, 2006. Referred to here as **Doran**.

[2] **Doran**, the index.

[3] *Insight*, 658[681].

[4] *Insight*, 642[665].

62, all of which have *Quantumchromodynamics* in their title.[5] It is in that context that the issue of unifying theories, GUTs, Grand Unification Theories, emerges. I like to think that these few pages can give some impression of the hundred-page discussion of metaproblems in that area that might have been.

And my title makes a third connection that is important in the search - mine and perhaps yours - for explanatory enlightenment: the connection to Lonergan's suggestions about *The Field* in the *Phenomenology and Logic* lectures.[6] This broader perspective is tackled immediately in Section 1. Section 2 heads us into meta-physics. In the third section I return to Doran's book and make a beginning on the further reflection on it that I had promised.[7] The fourth section points towards a meaning of the word *translation* that links in with problems both of implementation, of popularization, of adult growth, of *haute vulgarization*. It concludes by focusing on the full meaning of the title of this *Joistings*.

1. The Field and *Insight* Chapter 16

I immediate excuse myself from lengthy considerations here of Lonergan's push forward in his own, and our, enlightenment about being that lurks in his minding of the word *field*. In other words, I excuse myself here in that, first, I tackled that problem at some length in the third chapter of *Lack in the Beingstalk*, written in 2001 and now readily available. Secondly, there are the compact expressions of Lonergan on the topic

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[5]No harm in listing the three titles in order: "Quantumchromodynamics in the Field Context"; "Quantumchromodynamics: Quarks and Quirks"; "Quantumchromodynamic Bags: No Strings Attached".

[6]See the index to that book, under *Field*.

[7]See *Molecules*, *Minding*, *Meaning.* chapters 7 and 8 of **Doran** were the central topic of Part Three of the book. That left chapters 1-6 and 9-10 for consideration. *Joistings 19* raises questions regarding the relation of *What is Systematic Theology?* to Doran's previous book, *Theology and the Dialectic of History*. We shall get to that in *Lonergan's Standard Model of Effective Global Inquiry*.

available in *Phenomenology and Logic* that give solid leads, invitations, to personal searchings and fantasies. In this short section it seems to me best to add to those nudges by inviting your later existential digestion of the meaning of *field*, a meaning to be meshed into the molecules of your field of vision. Later? How much later? Perhaps, for you, not in this pilgrim state. I tackle this reflection as I end my 74th year - as it happens on Robby Burns' Day and in ways that would sweep his poetry, his timorous mousie, into a new reading. And in a week there is Joyce's Day. Burns was born on the Feast of St.Paul's Conversion; Joyce was born on the Feast of the Presentation: all part of *the field*. As is Joyce's account of his walk on Sandymount Strand, where I would have you begin, but in your own strand, in your own *Steps of the Master*. No: I do not wish you to go to Joyce's text, but to find your own eye-walk. Still, you might share the beginnings of his walky-talky. "Ineluctable modality of the visible: at least that if no more, thought through my eyes. Signatures of all things I am here to read, seaspawn and seawrack, the nearing tide, that rusty boot. Snotgreen, Bluesilver, rust: coloured signs. Limits of the diaphane."[8]

But before you go walking, pause over two patches of Lonergan sight-seeing. "As defined, the horizon is a relative term: what is meaningless-for-me may or may not be meaningless absolutely. By way of contrast, we shall also speak of the *field*: what is beyond the field is meaningless absolutely, insignificant absolutely, insoluble absolutely. The field is *the* universe, but my horizon defines *my* universe."[9]

"The difference between the horizon that a man may have and, on the other hand, the field that is defined objectively in terms of the totality of beings that exist, the difference that we have called the existential gap, is not merely a call to the authenticity of the subject in his private existence. It is also a call to authenticity of all subjects, an invitation to understand something about the process of history, and a summons to

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[8]James Joyce, *Ulysses*, Penguin 1986, 31.

[9]*Phenomenology and Logic*, 199.

decisiveness at a rather critical moment in the historical process."[10]

Let us first pause over a meaning of existential gap relevant to our struggle towards an understanding of the process of history, and indeed of our own ontogenetic process in history. We are back with the challenge of *Cantower 9*, "Position, Poisition, Proto-Possession", with a title that surely disturbs more than just beginners.

2. Unified Field Theories

The "come about" that we are thinking of - for you, as a possible project - is a stance that must emerge in physics in this next century, or millennium, if the spontaneous but truncated explanatory bent of present physics is to reach a luminous control of subjective apperception and linguistic expression in the pursuit of "an abstract relation field"[11] that is harmoniously integral to the full reach not only for "The Unity of the Proportionate Universe"[12] but also for its obediential destiny. That integral perspective is, of course, to belong - convergingly[13] - to both physicist and theologian, and it is certainly a key sign of out miserable times that both groups wallow quite unwittingly in their different obscurities regarding that dynamics of the cosmos. A few pages are not going to do more than nudge: I recall now Fermat's scribbles about his Last Theorem and my own amused suggestion that I would like to leave behind a few scribbles on Filmac's Last Theorem![14]

The seemingly humorous aside brings me to a central point of our present

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[10]*Ibid*., 300.

[11]*Insight*, 494[517].

[12]*Insight*, 510[533].

[13]For some leads on this convergence see *Molecules*, *Minding*, *Meaning*, chapters 6 and 7.

[14]See the concluding notes to chapter 14 of *Lonergan's Standard Model of Effective Global Inquiry*.

struggle, and I would say the struggle of more than one generation to come. Lonergan left behind, in more than one instance, a few scribbles on many theorems. There is that theorem and page on energy from which we must take our start;[15] there is the sentence on the 'come about"[16] towards which this section 1 moves; there are the three words, "abstract relation field,"[17] which haunts the journey through the section.

My appeal here - have I not made it in various ways many times before? - is for the next generation to take a stand on **the challenge not taken**? And that stand involves a stand on the dynamics of recycling that I identify with **The System**, fundamental systematics, as invented by Lonergan.[18] Only such a dynamic can seriously bring in, and forward, the physics that would make luminous the scribbles mentioned in the previous paragraph. The search for the meaning of those scribbles has been quashed by the past few generations of Lonergan students, almost to a man (and most of them were alas men) incapable of crossing "the natural bridge over which we may advance from our consideration of science to an examination of common sense."[19]

Nor has the community of physicists crossed that bridge, though spontaneous intelligence has lifted them, almost unknowingly, toward s the edge of the 'abstract relation field". But few of them - and neither Einstein not Hawking is included - have come to grips with the equivalent of those three words that is given in the fourth last paragraph of that same challenging chapter on "Space and Time". Let us pause over that paragraph in Lonergan, since it pertains directly to our reflections on the use of the

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[15]*Insight*, 443-4[468-9].

[16]*Insight*, 514[537].

[17]*Insight*, 494[517].

[18]I dealt with this identification in chapter 6 of *Molecules*, *Minding*, *Meaning*.

[19]The first paragraph of chapter 5 of *Insight*.

notion of "unified field structure"[20] in **Doran**.

"However, such a geometry is abstract. It is abstract, not indeed in the sense that it is not verified (for what is wanted is a geometry verified by physicists), but in the sense that it consists in a set of abstract propositions and invariant expressions and that, while applicable ro concrete extensions and durations, still it is applied differently from different spatio-temporal viewpoints. Thus, as long as men remain on the level of invariant expressions, they are not considering any concrete extension and duration. As soon as men consider concrete extensions and durations, each views them differently. The endless multiplicity of different spatio-temporal standpoints and of different frames of reference, so far from being transcended, reappears with every turn from the abstract to the concrete."[21]

To help us along here I must take some odd detours. We are battling various illusions and delusions that are both popular and meshed into scientific thinking - the clock paradox is only a surface instance.[22] What is the achievement of Einstein's field equations, so compactly expressed in strange symbolism? Well, let's go back to Poincare. I quote the first paragraph of a book that certainly should help to shake the popular illusion about unification theories in physics: *Chaos in the Cosmos. The Stunning Complexity of the Universe*.[23] The italics are Parker's.

"*The year was 1889. The French physicist- mathematician Henry Poincare could not believe his eyes. He had worked for months* on one of the most famous problems in science - the problem of three bodies moving around one another under mutual gravitational

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[20]**Doran**., 61-4, See the index under *Unified*.

[21]*Insight*, 171[195].

[22]*Insight*, chapter 5, section 4. See Terry Quinn's article in Volume 4 (2005) of the Website Journal from Memorial University, edited by Michael Shute, *Journal of Macrodynamic Analysis*.

[23]By Barry Parker, Plenum Press, New York and London, 1996.

attraction - and what he was seeing dismayed and troubled him. Since Newton's time it had been assumed that the problem was solvable. All that was needed was a little ingenuity and considerable perseverance, but Poincare saw that this was not the case. Strange, unexplainable things happened when he delved into the problem; it was not solvable at all."

Do the same strange things happen when, 125 years later, we delve into the problem of three quarks? Well, yes! So much for the *Grand* in Grand Unification Theories.

Back now to Einstein's Equations and to that quotation from Lonergan. No need, I hope, to get into Lonergan's rich meaning of abstract, a meaning which should have given you prolonged trouble at some stage in your struggle, since it goes against the very sound in you mouth, the cross-echos in your language, the ethos of our times. Brooding on the note above attached to the Einstein Equations can help but for those who have no experience of serious explanatory thinking I recommend - recall the first paragraph of *Insight* - the little puzzle about the number of ways you can seat 10 couples round a table.[24] The answer is "very abstract": what does that mean? It certainly means a serious effort to understand.

But here we need a particular focus, connecting to that paragraph from the end of chapter 5 of *Insight*. The equations include forms, tentative conjugate forms of space-time entities, but not the secondary determinations that get you into thinking and affirming particular things, like the earth moving in an almost-circle round the sun, about 93,000,000 miles away. Moreover, the turn to the concrete messes up the niceness of the hold we can have on forms. Further, if you throw in the moon into the turn to the

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[24] "How many ways can n married couples be seated about a round table in such a manner that there is always one man between two women and none of the men is ever next to his own wife?" (This problem, invented by Edouard Lucas a the end of the 18th century, is quite a challenge: discovering this is an education in serious explanatory thinking. You will find leads in my article of volume 1 of the Website *Journal of Macrodynamic Analysis*.) The problem, of course, belongs to the age of pre-gay couples.

concrete - and if you don't you are not turning to the concrete! - then you are in Poincare's mess. So, the standard illustration in texts of the turn to the concrete leaves out the third body in trying to figure out what the forms of mutual pulling, gravitation, do to the real relations - including secondary determinations - of a "big puller" on a small puller.

So much for the grand unifying view of Einstein. And if you really want to shatter your illusions of grandeur and control, think of the 14 billion galaxies with all their little pulling stars and planets and atoms and neutrons! You begin to suspect, perhaps, that Einstein's Equations are a bit like the gas law PV = C which says nothing about the molecules moving round? A useful idea, but no, the Einstein Equations are not a statistical cover-up: they are open to particularizing, to the addition of acts to forms over any range of things. Enough, too much: but you get the general drift?

3. Returning to *What is Systematic Theology?*

I move to this third section very deliberately so as to hang on to your flagging attention. We are back with Doran's title, yet I would have you reach towards a fuller personal meaning as we, you and I, reach on beyond these general equations of mine to glimpse, taste, that **What is Systematic Theology?** is an asking - is it heart held? - about God and I; it is, at heart and in heart, a two-body problem.

Back to Einstein, who struggled on towards a fuller set of equations that amazingly built in Maxwell's four-hypothesis. But first recall that it was Maxwell I appealed to when I took a stand against Doran's view that the 4-hypothesis of Lonergan was not a sufficient basis for a theology of history. It is elegantly sufficient: but more on that below. Like the gravitational equations, the four Maxwell equations are abstract, magnificently rich then. With them you can close in on any electrical situation - which cannot but be magnetic, as the equations "tell" - and get a glimpse of concrete goings-on. Illustrating that would fill pages and requires hours of messing in classroom and laboratory: go check it out in university text books. Maxwell's equations are a very

decent shot at glimpsing the forms of electrons (massed of course) in their actuality. Getting them together with Einstein's other stuff, that is part of what Lonergan is hinting at at the end of section 2.5 of chapter 5 of *Insight*. You probably glided over that bit?! And no doubt you will have to do a bit of gliding over the next page: but at least stay with the print: we are reaching for richer analogues for our search for God. Perhaps I should versify this page that pirouettes towards a sniff of the flowering of twentieth century physics, a flower in a crannied wall?[25]

As I noted already, the story of that flowering, that dawning, is magnificently told by Lochlainn O'Raifeartaigh in his *The Dawning of Gauge Theory*. Besides gravitational and electrical forces there are others, like nuclear forces. No need to be a nuclear physicist to suspect that: something has got to hold together atoms that contain, say, the push-apart of a hundred electrons that dislike each other. That something is the actual conjugate forms of nucleons, and the pull-close has to be pretty powerful. Go figure!

But, despite the fact that in the past fifty years dozens of carriers of such conjugates have been discovered, giving a quite complex context to the problem of patterns of dispersedness and energy, Lonergan was right on fifty years ago. The search is for the forms that are the controlling forms[26] of space-time geometry. "Gauge theory, and thus the theory of strong, weak and electromagnetic interactions, is basically a geometrical theory. This is not only aesthetically pleasing but brings unification of

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[25]I am recalling the short Tennyson poem referred to by Lonergan on page 31 of *For a New Political Economy*. "Flower in the crannied wall, / I pluck you out of the crannies, / I hold you here, root and all, in my hand. / Little flower - but if I could understand / What you are, root and all, and all in all, / I should know what God and man is."

[26]A control, of course, within the larger control discussed, in its essentials, in chapters 16 and 19 of *Insight*. Statistics, divergent conditions, emergent probability, are held in creative unity in tripersonal subtlety.

weak, electromagnetic and strong interactions with gravitation a step closer."[27]

The geometry, of course, is not Euclidean, nor even Riemannian but a fiber-bundle[28] version of differential geometry that carries within itself the aspects of invariance and symmetry attended to by Lonergan: and here is where we need verse. I hope that you will bear with me and read O'Raifeartaigh's neat summary as you might read Beethoven's Late Quartets.

"The basic idea of gauge symmetry is that a physical system is invariant with respect to some rigid (space-time independent) group of continuous transformations, G say, that it remains invariant when the group is made local (space-time dependent), that is, when G –> G(x), where $x = x_m$, m = 0, 1, 2, 3 are the space-time coordinates, provided that the ordinary space-time derivatives d_m are changed to covariant derivatives D_m . The covariant derivatives D_m take the form $D_m = d_m + A_m(x)$ where $A_m(x)$ are vector fields which lie in the Lie Algebra of the rigid group G and which transform so that D_m transform covariantly with respect to the local group. That means that invariance with respect to the local symmetry *forces the introduction of the vector fields $A_m(x)$ and determines the manner in which these fields interact with themselves and with matter*. The fields $A_m(x)$ turn out to be just the well-known radiation fields of particle physics, namely, the gravitational field, the electromagnetic field, the massive vector meson fields Z^0 , W^+, W^- of the weak interactions and the colour fields $A^c{}_m$ of the strong interactions. Thus gauge symmetry introduces all the physical radiation fields in a

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[27]Lochlainn O'Raifeartaigh, *Group Structure of Gauge Theory*, Cambridge University Press, 1986, 82. Add ***Dawning***,(see note 29 below), p. 5.

[28]Thinking back to my own struggles with this stuff, it seems futile to illustrate or describe. Imagine a three dimensional Euclidean x-y-z space, then imagine this space as a point in time: a pretty packed point. Go on to muse over the packed pseudo-points of our actual world, only on the level of physics. Each packed location has a bundle of geometric structures. Perhaps it is useful to think of you out and about with your cell phone, checking in to anywhere from your pseudo-point. I wonder does this help? See my usual reference for surveying contemporary physics, Ian D Lawrie, *A Grand Tour of Theoretical Physics*, Institute of {Physics Publishing, Bristol and Philadelphia, pbk, 1998, 42,157: chapter 8 is the key chapter.

natural way and determines the form of their interactions, up to a few coupling constants.

It is remarkable that this variety of physical fields, which play such different roles at the phenomenological level, are all manifestations of the same simple principle and even more remarkable that the way in which they interact with matter is prescribed in advance. It is not surprising, therefore, to find that the covariant derivative has a deep geometrical significance. As mentioned above, modern differential geometry is formulated in terms of fibre-bundles and in this context the G(x) are identified as sections of principal fiber-bundles and the radiation fields $A_m(x)$ as mathematical *connections*. For metrical geometry the connections are just the well-known Christoffel symbols and are secondary to the metric tensor from which they are derived, but for more general geometries the connections are the fundamental entities."[29]

Obscure? Indeed. In the final section I would have us share the problem of translation, communication. But here I would just make two points. First, whatever the theory reached, the view I presented remains the same. Classic theory, unified or not, does not reach the concrete determinations. "Classical method reveals the primary relativities without the secondary determinations of concrete relations; it provides an abstract relational field, say, for the positions and moments of masses, but it leaves to observation, and, in the general case, to probabilities the determination of how many masses with what moments are in what positions."[30]

Secondly, the entire enterprise of contemporary physics is ripe for the illumination of the use of metaphysical equivalence. So, "the connections are the fundamental entities" : are these complex formal entities the conjugate forms that represent the bundles, in each space-time, of possibilities of actual patterns, structure?

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[29]Lochlainn O'Raifeartaigh, *The Dawning of Gauge Theory*, Princeton University Press, 1997, 4-5. The italics are the author's. I have had to juggle with symbols e.g. replacing the Greek *mu* with the Latin *m.*

[30]*Insight*, 494[517].

Generalized empirical method, in that context, and in the context of the full collaboration system of general functional specialization, would help us on our luminous way.

4. The Fundamental Problem of Translation

I wish to push here for the larger view of the *Joisting's* title, but first, let us be clear on the disagreement with Doran about Lonergan's 4-hypothesis's capability of reaching the processes of history. I used Maxwell's 4-hypothesis as a parallel. Maxwell's equations do not reach to the concrete, but they are capable of doing so through observation, prediction, probability theory. The Lonergan hypothesis has similar capability. Further, I enlarged on that and on the fuller capability by pointing to the deductive expansion of section 9 of chapter 19 of *Insight*, indicating the possibility of enlarging the initial hypothesis about God as understanding to include God as an ultimate relational field.

Let us approach the broad problem of translation in stages in a few concluding remarks. First, a useful translation of talk of a unified theory of the entities of physics. Consider the periodic table with its 100+ elements. Suppose we were part of the way towards that table: the year could be 1860. Then - you recall the diagram? - we might have a certain number of vertical groups of elements, some of which we could connect to others. But the whole layout that we are familiar with still eludes relational connectedness. Does this help a little? Of course the 100+ in physics are not just elements: they include elements and compounds. The elements are such entities as quarks and leptons in problematic families, and so on into present obscurities. For example, are these elements in some sense point-like or are they string-like? But let us not go there: my main idea here is the idea of helping towards understanding by analogy. I translate the problem to a lower level of difficulty, one in which there is already an answer that I am familiar with, about which the listener might have some clue. It is evident to me that Doran's procedure here - and I suspect Monsour's - is

flawed: the analogue was familiar only through *haute vulgarization*. Such foolishness will be screened out in the later cycling of functional specialization.

But now I am up against another problem of translation: how might such screening work? We are back[31] with the problem of specifying the metaphysical equivalents of functional specialist operations, and such specification is hard enough when it is an *a posteriori* task. It is a daunting challenge when illustrations of such operation are just not there. It is even more daunting when one is opposed to interpretations of Lonergan's achievement by disciples who would seem to wish that achievement to go away, or at least to slip into the role of being a handy filing system for individual thinkers. But, as I have argued in chapter 1 of *Molecules, Minding, Meaning*, history will not let it go away.

To such an identification of the pressures of history to extend Adam Smith's advocacy of division of labor from the pin and the plough to the pen and minding I have added parallels, illustrations, analogies, and especially 200 pages of commentary on that key page of *Method in Theology*, page 250. There, on what one might consider the most brilliant page of the book, one finds a unified field theory of dialectic. Might it find application in the concrete particular you?

[31]I treated the problem in chapter 10 of *Molecules*, *Minding*, *Meaning*.