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THE INNER REFORMATION OF THE SCIENCES: AN AMBIGUITY IN THE RADICALLY ORTHODOX THOUGHT OF JOHN MILBANK?

ABSTRACT

Although both Radical Orthodoxy and *Reformational Philosophy* question the autonomy of theoretical reason, the views of prominent representatives of *Radical Orthodoxy* do not enable an inner reformation of the non-theological academic disciplines. Whereas *Radical Orthodoxy* holds that philosophy is concerned with *being* as such, theology investigates the *ground* of being, and being *in respectu Dei*. *Reformational Philosophy* questions theology as "queen of the sciences" and holds that every creature has to be "related" to God. Milbank contemplates the idea of a Christian sociology, by considering the church as a distinct society (*altera civitas*), but considers it to be *silly* to talk of a *Christian mathematics*. An alternative idea of Christian scholarship is advanced in opposition to Milbank's classical Thomistic view, namely that theology has to preserve and fulfil philosophy, echoing the Scholastic adage that grace does not eliminate nature, but perfects it (*gratia naturam non tollit*, *sed perficit*).

1. INTRODUCTION

This article investigates the possibility of Christian scholarship within the scientific disciplines of sociology and mathematics, by examining some representatives of *Radical Orthodoxy*, on the one hand, and *Reformational Philosophy*, on the other, while considering elements of the broader contours of these two intellectual traditions.

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2. ORIENTATION

Milbank, Pickstock and Ward (2006:2) explain that *Radical Orthodoxy* aims at the recovery of a "fully Christianised ontology and practical philosophy consonant with authentic Christian doctrine". *Reformational Philosophy* also aims at a "fully Christianised ontology" – understood in terms of a non-reductionism aim, namely to avoid the *deification* of anything within creation.

For *Reformational Philosophy*, this entails that there is no terrain or domain within creation that can be independent of God. Whenever an attempt is made to absolutize something within creation, theoretical thought gets entangled in unsolvable antinomies, while violating the cosmic principle of the *excluded antinomy* (*principium exclusae antinomiae*) (cf. Dooyeweerd 1997:36). It is noteworthy that one of the above-mentioned representatives of the movement of *Radical Orthodoxy*, Catharine Pickstock, implicitly explains the way in which Descartes understands physical nature in anti-reductionist terms. She writes that, in the thought of Descartes, "the physical world is reduced to the principles of extension, motion, and mechanical causes" (Pickstock 1998:61). She also opposes "humanist rationalism" (Pickstock 2006b:48).

Reworking the ancient Greek idea of "participation", authors from the circles of *Radical Orthodoxy* emphasize that no "territory independent of God" should be tolerated: "The central theological framework of radical orthodoxy is 'participation' as developed by Plato and reworked by Christianity, because any alternative configuration perforce reserves a territory independent of God" (Milbank *et al.* 2006:3).

However, these authors nowhere set out to launch a programme aimed at reclaiming the domain of scholarship – including the natural and social sciences – in the sense of a "fully Christianised ontology". Pickstock wrote an essay in which he "examines the metaphysical category of 'music' in the Western tradition with special reference to Augustine's *De Musica* (composed in AD 391)". In it, he briefly pays attention to what became known as the *quadrivium*, according to which *mathematics* "was subdivided into arithmetic, geometry, music and astronomy" (Pickstock 2006b:243). In terms of her concern for music theory, she evinces an awareness of the opposition between Platonist and nominalist approaches in mathematics:

> In recent twentieth-century musical theory, there is a debate between those who uphold a 'Platonic' theory of music, according to which music is an essentially mental phenomenon, for whom the 'real work' is something which exists outside its instantiation in performance, in parallel with the so-called Platonic view of mathematics according

to which abstract numbers are realities, and others who take a
nominalist approach (Pickstock 2006b:259).

This remark borders on an insight into the mathematical (set-theoretical)
implications of alternative standpoints in mathematics. Simply compare
the way in which Stegmüller (1965:117-118) maps the three ontological
positions, namely nominalism, conceptualism, and platonism, in terms
of the quantitative categories "finite totality (*Gesamtheit*) – denumerable
infinite totality – non-denumerable infinite totality".

The only one within the circles of *Radical Orthodoxy* who briefly
mentioned something about a kind of Christian sociology and a Christian
mathematics is John Milbank. The context in which he raised this issue
is firmly rooted in the general orientation of authors such as Ward and
Pickstock who, as outlined earlier, are to a large extent compatible with
the views of *Reformational Philosophy*.

One of the shared concerns of *Radical Orthodoxy* and *Reformational
Philosophy* is found in their reaction to what Dooyeweerd calls the dogma
of the autonomy of reason (cf. Dooyeweerd 2012 Part One, Chapter one).
Radical Orthodoxy wants to return to the patristic and medieval roots of
knowledge as divine illumination, which transcends "the modern bastard
dualisms of faith and reason, grace and nature", while systematically
engaging in a critique of modern society, culture, politics, art, science
and philosophy, because there is no territory independent of God. While
acknowledging the need for eternal stability, making things in an authentic
way finds its end in what is liturgical. It opposes the idea that any sphere
of creation may be withdrawn from the gift that is creation. However,
when it comes to theology, philosophy and the non-theological special
sciences, crucial differences are surfacing. Milbank assigns "all merely
natural enquiries" to philosophy, which is primarily concerned with being
qua being (à la Aristotle). But then he also asserts that theology not only
investigates *esse* as such, but also "the ground of all beings, and all in
relation to this ground and source". According to Milbank, the difference
between theology and philosophy is that the former observes being in
relation to God – a view merely continuing what is already found in the
thought of Thomas Aquinas – whereas philosophy investigates being
as being. Milbank rejects the idea of modal aspects as distinct points
of entry for the special sciences to reality, on the basis of a twofold
misunderstanding of what this idea really entails. First, he does not realize
that, according to Dooyeweerd, the special sciences do not study an aspect
of reality, but rather examine reality in its totality from the *perspective* of
one or other modal aspect, within which everything in principle functions.
Secondly, abstracting a modal aspect does not amount to *dividing* reality

by severing a part thereof. Once *modal abstraction*[1] is acknowledged as the distinctive feature of scholarly thinking (cf. Coletto 2011; Troost 2004; Ouweneel 2014; Strauss 2009; 2015), it becomes clear why theology is a special science and why it, therefore, depends on a philosophical (theoretical) view of reality. The alternative foundation provided by the idea of modal abstraction makes it possible to argue for a Christian foundation of the special sciences without assigning to theology an intermediate role. I shall explore that every Christian is not a theologian, by employing insights of *Reformational Philosophy* developed on the basis of the theory of the interconnections between the various aspects of reality. I shall elucidate this with reference to the possibility of a Christian sociology and a Christian mathematics.

3. RADICAL REFORMATION

It is striking that *Radical Orthodoxy* and *Reformational Philosophy* both question what Dooyeweerd prefers to designate as the *dogma* of the autonomy of (theoretical) reason (cf. Dooyeweerd 2012, Part One, Chapter one). This dogma permeates the entire history of Western philosophy, Greek philosophy included. Dooyeweerd increasingly challenged this dogma, eventually by refining his transcendental critique of theoretical thought. The latter is directed at discovering those transcendental and transcendent conditions, making possible theoretical thinking as such – not merely theology.

Smith mentions that, according to *Radical Orthodoxy*, a reassertion of the claim of theology is required, namely "to give an account of every sphere of creation" – an ideal also advanced by *Reformational Philosophy* – but not exclusively assigned to theology! In this instance, Dooyeweerd agrees with Calvin and Kuyper who realized that the reformation touched the heart as the religious root of human existence and, therefore, cannot be restricted to the church and theology, for it has to permeate all walks of life.

However, the reformational perspective distanced itself from both the ecclesiastical unified medieval culture ("churchifying" all of life) and the "theologization" of Christian action. Milbank believes that "theology is not positioned by other disciplines but rather positions them with respect to itself" (Smith 2004:168) – and theology depicts itself as "the queen of the sciences for the inhabitants of the *altera civitas*" (Milbank 2006:382).

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1 Modal abstraction points at lifting out (identifying) one or other aspect by disregarding (distinguishing it from) the others.

When this view of Milbank is confronted with the nature and implications of modal abstraction, it is no longer tenable to equate Christian scholarly endeavours with *theology*. Ouweneel is, therefore, justified in holding that Christian theology is only *one of many* special sciences that ought to be supported by a Christian philosophy. Theology, as a special science, has its own questions, which, by definition, are philosophical in nature:

> What is theology? Is it a science, and if so, on what grounds? How does theology relate to non-scientific Bible study? What are the criteria for, and methods of, academic theology? What is its academic purpose? How are theological theories formed? What is their status? How do they relate to church dogmas and confessions? (Ouweneel 2014:28).

Milbank formulated his view of theology with an appeal to the claim that theology is not concerned with one ontic item only, but with *esse* as the ground of all beings. Therefore, it cannot be a *specialism*, but if "it were, it would be idolatrous, for theology concerns not one area, not one ontic item among others, but *esse* as such, the ground of all beings, and all in relation to this ground and source" (Milbank 2004:14).

In their *Foreword* to *Radical Orthodoxy*, Milbank, Ward and Pickstock point out that the essays united in this collection are based on "the idea that every discipline must be framed by a theological perspective" (Milbank 2006:3). They also explain that this would prevent reserving "a territory independent of God". This view embodies the idea of *participation*, which "refuses any reserve of created territory, while allowing finite things their own integrity".[2]

Surely, *Reformational Philosophy* also accepts the creation-encompassing scope advocated by these authors. Particularly well-known is Kuyper's pronouncement: "There is not a square inch in the whole domain of our human existence over which Christ, who is Sovereign over all, does not cry: 'Mine'."[3]

However, the idea that "every discipline must be framed by a theological perspective" is highly problematic. When Milbank speaks of "a fully Christianized ontology", it is clear that ontology as such is considered to be non-Christian in nature. The same applies to the other (non-theological) disciplines, for they have to be "framed by a theological perspective" in order to experience a Christian influence.

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2   For critical remarks in respect of the idea of participation from the perspective of Reformational Philosophy, cf. Smit (1950:34 ff.).

3   The English translation of this phrase is quoted from Bishop (2013:1) – it is found in Kuyper's Stone Lectures)

4. THE DISTINCTNESS OF STRUCTURE AND DIRECTION

Radical Orthodoxy may benefit from a crucial distinction found within reformational philosophy, namely that between the ultimate (religious) commitment of a thinker and the differentiated way in which ultimate commitments direct the various branches of human life, including faith in its *certitudinal* sense. The word *religion* may, therefore, be used in two different, but related senses:

1. It may refer to the radical, central and integral depth-dimension of creation, touching the *heart* of being human and, therefore, giving direction to all the issues of life proceeding from this core dimension (cf. Proverbs 4:23).

2. It may designate one among many articulations of life, familiar to us in faith and confessional activities found alongside all the other differentiated issues of life.[4]

One may reserve the word religion for (1) and faith for (2). In English, the word *religion* is normally used to designate only the faith function of reality and the activities it qualifies, namely so-called "religious endeavours". The important distinction is, therefore, between religion (2) (understood in the aspectual sense of faith), and religion (1) in its life-encompassing radical and integral sense, where *radical* means touching the root of human existence, and *integral* means embracing all of life. Dooyeweerd explains his intention in this regard as follows:

> The modal law-sphere of faith is often identified with religion, which is very detrimental to religious self-knowledge. Up to now we have always spoken of faith as of a modal meaning-function, viz. as the second terminal function of temporal human experience and temporal reality. As a subject-function faith is at the same time the terminal function of human existence in the transcendental direction of time. As such it is found in all human beings, in believers in Christ as well as in those whose faith reveals itself in an apostate direction. There is an apostate faith, and there is a faith which can only come into action in man through the Spirit of God. But both function within the modal structure of a law-sphere, implanted in human nature at creation. In both a sharp distinction must be made between the subjective function, the principium, the content, the direction and the root of belief. And in both cases it is obvious that the function of faith cannot be identified with the religious root of temporal existence or, in the words of the Ecclesiastes, with the heart from which spring the

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4   Cf. Gal. 5:14, 22-23; I Timothy 6:11 where the terms 'love' and 'faith', for example, are not employed in a central, but in a differentiated sense.

issues of life. Believing, logical distinction, feeling, etc. are temporal functions delimited from one another in law-spheres of mutually irreducible meaning-modalities. But the religious root of our entire existence is not a function; religion is not enclosed in a temporal law-sphere (Dooyeweerd 1997:298).

When the faith aspect of reality is modally abstracted in order to serve as the angle of approach for theology as a special science, it requires a more-than-special-scientific perspective on the cohering diversity of aspects and entities within reality, which is philosophical in nature. For this reason, the special sciences are dependent upon a philosophical totality view exceeding their modally delimited fields of investigation.

Another way of differentiating between philosophy and the various academic disciplines (special sciences) is to distinguish between those disciplines exceeding their own confines when attempting to define themselves, and the foundational discipline, which has the task of investigating basic questions such as these, *i.e.* questions prior to the differentiation and specialization of the diverse special sciences. By definition, one may call the former *special sciences* and the latter *philosophy*.

3. METAPHYSICS INVESTIGATING BEING AS BEING: *IN RESPECTU DEI*?

Clearly, Milbank is mistaken by holding that the theory of modal aspects (law spheres) "divides" reality, because abstracting modal aspects does not divide anything. His own approach, namely that theology is concerned with being (*esse*) as such (albeit *in respectu Dei*), echoes what Aristotle posited in respect of the nature of philosophy and the special sciences. Aristotle explains that the special sciences "cut off a part of being and investigate the attribute of this part". By contrast, there is, according to him, "a science which investigates being as being", but "this is not the same as any of the special sciences; for none of the other treats universally of being as being" (*Metaph.* 1003a20-24; Aristotle 2001:731).

Thomas Aquinas accepts the Aristotelian view of philosophy as the discipline that observes what belongs to creatures on the basis of their own natures. The believer, by contrast, discerns in creatures only that which applies to them *in their relation to God*: "The Christian faith does not observe things in their own being, such as fire as fire, but insofar as they represent the majesty of God and somehow is ordained in relation to God" (*Summa contra Gentiles* [ScG] II, 4; Aquinas 1982:10, 12).

Accompanied by the conception of theology as the queen of the sciences (with the others as "handmaidens"), philosophy is supposed to investigate being as such, while theology relates everything to the "ground and source" of all being. According to Heidegger, the logical character of metaphysics explains "how God comes into philosophy," namely as "the grounding Ground" of the totality of all that is (Pannenberg 1990:8).

Pannenberg opts for a view that opposes the one advanced by Heidegger. Like Milbank, he holds that theology "is essentially an inquiry [*Wissenschaft*] into God and his revelation" and then claims that "[e]verything else that occurs within theology can become a theme for the theologian only 'in relation to God', as Thomas Aquinas put it: sub ratione Dei" (Pannenberg 1990:120).[5] The South African philosopher, Stoker advances similar ideas. He distinguishes between the special sciences studying a "part", "subject", or "aspect" of reality, philosophy the totality of the cosmos, whereas theology investigates reality *in relation to God* (Stoker 1970:425; Stoker 1951:46).

However, a Christian view of creation has to understand every single aspect and every entity *in relation to God*. *Reformational Philosophy* acknowledges this connection in the creation order (law order), to which every creature is subject, and points out that all theoretical concerns are to be directed by a central basic motive (ultimate commitment) and based upon a law idea as theoretical hypothesis shaping theory formation (Dooyeweerd 1997-I:88).

Radical Orthodoxy appears *not* to have sufficiently considered the crucial role of a law idea within philosophy and within all the academic disciplines. The result is that, according to its view, philosophy and the special sciences can only become Christian when they are theologically transformed. Bear in mind that the aim of *Radical Orthodoxy* is to recover and extend "a fully Christianized ontology and practical philosophy consonant with authentic Christian doctrine" (Milbank *et al.* 2006:2). Consistent with Milbank's view that, for example, the "Christian contribution [to] say economics, is always a theological contribution" (Milbank 2004:14), one has to conclude that Christianizing ontology would transform it into theology.

However, what such a Christianized ontology would entail, apart from seeing everything in relation to God, is not well articulated. Milbank finds a point of connection in the church as a distinct society (*altera civitas*)

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5   On the same page he remarks: "Christian theology would lose not only its specific content but also, and most importantly, the consciousness of truth that is intrinsic to it, if it were to follow Heidegger's advice to stop speaking of God in the realm of thought."

in order to speak of a "Christian sociology" or of "theology as a social science". He believes that this mode of speech is not "as silly as talk of a 'Christian mathematics'", to which he modestly immediately adds the remark: "I suspend judgement here" (Milbank 2006:382).

4. A RETURN TO THE NATURE-GRACE SPLIT?

Positioning the church as a society distinct from the other societal entities (an *altera civitas*) reverts to the original medieval dualism of nature and grace, despite the fact that, in another context, Milbank rejects the dualism of nature and grace. If only the *altera civitas* can be Christian, then implicitly the directional antithesis between good and evil is identified with (with opposing domains of) the order of creation. Compare the remark of Milbank (2006:440), namely that salvation is the "peace of the *altera civitas*". By accepting an *altera civitas* as starting point of a Christian social theory, Milbank's approach inevitably terminates in a classical two-realm perspective. According to this view, the non-ecclesiastical realm of society cannot be intrinsically Christian, whereas the *altera civitas*, belonging to an alternative realm, is, by definition, intrinsically Christian in nature.

Once this mistaken identification is left behind, one may rather, as Wolters (1981:10-11) emphasizes, accept

> that every creature of God is good, and that sin and salvation are matters of opposing religious direction, not of good and evil sectors of the created order. All aspects of created life and reality are in principle equally good, and all are in principle equally subject to perversion and renewal.

Combined with the idea of the *liturgical consummation* of philosophy, this view of the *altera civitas* once more fits the classical Thomistic conviction regarding *gratia naturam non tollit*, *sed perficit* (nature is not eliminated by grace, but perfected by it). Implicitly, this view is dependent upon the neo-Platonic scheme of *Urbild* and *Abbild* (*original type* and *copy*), also found in the thought of Augustine (cf. Von Hippel 1955:247-248).

The central position of the Old Humanity in Adam and the New Humanity in Christ equally transcends the church as an institution (Christian community of faith) and all the other societal communities and collectivities. Identifying this root-meaning of the *New Humanity* (*i.e.* the *branches of the True Vine*, the *Body of Christ*, and so on) with the church as an institution, amounts to an interchange of *root* and *branch*, thus introducing a *pseudo-root* for human life. This is typical of an *ideology*. Simply consider an ideology of the *state*, the *people* (*volk*) or the *church*.

Within the perspective of such an ideology, those societal connections distinct from the pseudo-root are then implanted in this new root of life. The outcome of such a view invariably leads to a "churchification" of life, to a totalitarian state, or to a life-encompassing cultural community, and so on.[6]

5. A CHRISTIAN SOCIOLOGY AND A CHRISTIAN MATHEMATICS?

I now return to what Milbank said about a Christian sociology and the "silly" possibility of a Christian mathematics.

5.1 Sociology

Milbank (2006:382) relates a "distinguishable Christian social theory" to a "Christian mode of action, a definite practice", which implies that such a theory is "first and foremost an ecclesiology" and that the church, "by virtue of its institution", is already a reading of other human societies which makes it possible "to consider ecclesiology as also a 'sociology'", while bearing in mind that it involves "the actual genesis of real historical churches" and not simply "the imagination of an ecclesial ideal". The concrete historical development of "the church", as it "defines itself", remains a society distinct from other societal communities and collectivities. In this context, the title of Chapter 12 is significant, "The Other City: Theology as a Social Science" (Milbank 2006:382), for it suggests the classical structural distinction between "church" and "world" with the implied identification of *structure* and *direction*.

Wolters (1994:51) remarks that as far as he can tell

> ... the Bible is unique in its uncompromising rejection of all attempts to confuse structure and direction or to identify part of creation as either the villain or the savior. All other religions, philosophies, and worldviews in one way or another fall into the trap of failing to keep creation and fall distinct, and this trap continues to be an ever-present danger for Christian thinking.

He continues in a different context: "To conceive either the fall or Christ's deliverance as encompassing less than the whole of creation is to compromise the biblical teaching of the radical nature of the fall and the cosmic scope of redemption" (Wolters 1994:71). No human practice or

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6   It was the Romantic Movement by the end of the 18th and the beginning of the 19th century that introduced the new ideology of the Folk community.

activity could substitute the mediating position of Christ, which means that neither theology nor philosophy can replace Christ's redemptive action. The Christian character of scholarly activities is solely rooted in the renewing spirit of God that directs all of life towards the wholehearted love of God and fellow human beings.

Smith mentions the fact that both Dooyeweerd and *Radical Orthodoxy* make a plea for a Christian account of every sphere of reality, but that Dooyeweerd "refuses any identification of the biblical ground-motive with theology or the church" (Smith 2004:174). Smith also alludes to the confusion of *structure* and *direction* in the thought of Milbank:

> This is also why Dooyeweerd, unlike Milbank … can advocate a distinctly Christian philosophy. Unlike Milbank, Dooyeweerd does not confuse the apostate (secular) direction of philosophy with the structure of philosophy as a creational mode of reflection. What is required, however, is a rooting of philosophy in the biblical ground-motive or revelation (Smith 2004:174, note 95).

Within the legacy of *Reformational Philosophy*, a non-reductionist philosophical ontology, supported by the transcendental-empirical method (cf. Strauss 2006a:111-123), provides the (theoretical) basis for developing a Christian sociology. It ought to accomplish this task by taking its starting point in the radical and integral biblical ground-motive of creation, fall and redemption.

This programme finds a provisional elaboration in the work of Strauss (2006a), an approach that may redirect the reflections of *Radical Orthodoxy* within this field. It addresses the status of sociology as a scientific discipline, then proceeds with an analysis of the *analogical* basic concepts of sociology, and concludes with an investigation of its *compound* (or complex) basic concepts as well as a brief account of its *typical* concepts. On the whole, this work may be viewed as a contribution to the development of an integral Christian sociology.

Although Milbank is hesitant to contemplate, alongside his understanding of a Christian sociology or theology as a social science, the possibility of a "Christian mathematics" (disqualified as "silly talk"), his modesty – "I suspend judgment here" – does invite a more constructive reaction, for despite the apparent exact nature of mathematics, the history of this discipline tells a different story.

5.2   Mathematics

Three diverging schools of thought emerged in modern mathematics. These trends could be related to their respective key figures, namely Brouwer, Gödel, and Hilbert, as well as to the connections they had with Kant's *Critique of Pure Reason* (1781 [1787]). From a historical perspective, these schools of thought derive from the three main parts of Kant's *Critique*. Brouwer explores the implications of the *transcendental aesthetics*; Gödel uses the *transcendental analytic* as his point of departure, while Hilbert calls upon the *transcendental dialectic*.

Hilbert believed that it would be possible to produce a rigorous demonstration that mathematics is consistent. In 1931, in an article on formally undecidable propositions in Russell and Whitehead's *Principia Mathematica*, and related systems, Gödel indicated that a proof of the consistency of arithmetic cannot be reflected in the formal deductions of arithmetic itself – the consistency of arithmetic, therefore, cannot be proven in terms of the axioms of arithmetic. In a formal axiomatic system Z, there is always a statement A that can be neither proved nor disproved with the aid of axioms of Z. In other words, to prove that the conclusions reached from certain axioms are consistent, it is not possible to use the method in question. In principle, every axiomatic system in mathematics is incomplete – it requires and presupposes insight into its content, which transcends its own formalism. Grünfeld explains Gödel's achievement as follows:

> Gödel proved that if any formal theory T that is adequate to include the theory of whole numbers is consistent, then T is incomplete. This means that there is a meaningful statement of number theory S, such that neither S nor not-S is provable within the theory. Now either S or not-S is true; there is then a true statement of number theory which is not provable and so not decidable. The price of consistency is incompleteness (Grünfeld 1983:45; cf. also Hofstadter 1989:86-87).

Weyl succinctly portrays the ironical situation in which Hilbert was placed:

> It must have been hard on Hilbert, the axiomatist, to acknowledge that the insight of consistency is rather to be attained by intuitive reasoning which is based on evidence and not on axioms (Weyl 1970:269).

In 1900, the French mathematician, Poincaré, proudly claimed that mathematics has reached absolute rigour. In a standard work on the foundations of set theory, however, we read:

> Ironically enough, at the very same time that Poincaré made his proud claim, it has already turned out that the theory of the infinite systems of integers – nothing else but part of set theory – was very far from having obtained absolute security of foundations. More than the mere appearance of antinomies in the basis of set theory, and thereby of analysis, it is the fact that the various attempts to overcome these antinomies, ..., revealed a far-going and surprising divergence of opinions and conceptions on the most fundamental mathematical notions, such as set and number themselves, which induces us to speak of the third foundational crisis that mathematics is still undergoing (Fraenkel *et al.* 1973:14).

A few years later, Kline published a book on the loss of certainty in mathematics. He remarks:

> The developments in the foundations of mathematics since 1900 are bewildering, and the present state of mathematics is anomalous and deplorable. The light of truth no longer illuminates the road to follow. In place of the unique, universally admired and universally accepted body of mathematics whose proofs, though sometimes requiring emendation, were regarded as the acme of sound reasoning, we now have conflicting approaches to mathematics. Beyond the logicist, intuitionist, and formalist bases, the approach through set theory alone gives many options. Some divergent and even conflicting positions are possible even within the other schools. Thus the constructivist movement within the intuitionist philosophy has many splinter groups. Within formalism there are choices to be made about what principles of metamathematics may be employed. Non-standard analysis, though not a doctrine of any one school, permits an alternative approach to analysis which may also lead to conflicting views. At the very least what was considered to be illogical and to be banished is now accepted by some schools as logically sound (Kline 1980:275-276).

Add to this assessment a statement made by Kleene (1952:52) (1952:52) concerning the peculiar character of intuitionistic mathematics: "The intuitionists have created a whole new mathematics, including a theory of the continuum and a set theory. This mathematics employs concepts and makes distinctions not found in the classical mathematics". Beth (1965:89) also states:

> It is clear that intuitionistic mathematics is not merely that part of classical mathematics which would remain if one removed certain methods not acceptable to the intuitionists. On the contrary, intuitionistic mathematics replaces those methods by other ones that lead to results which find no counterpart in classical mathematics.

Finally, listen to the assessment of the father of 20ᵗʰ-century intuitionism, Brouwer. He believes that "classical analysis … has less mathematical truth than intuitionistic analysis" (Brouwer 1964:78). He proceeds to characterise the differences between intuitionistic and formalistic mathematics as follows:

> As a matter of course also the languages of the two mathematical schools diverge. And even in those mathematical theories which are covered by a neutral language, i.e. by a language understandable on both sides, either school operates with mathematical entities not recognized by the other one: there are intuitionist structures which cannot be fitted into any classical logical frame, and there are classical arguments not applying to any introspective image. Likewise, in the theories mentioned, mathematical entities recognized by both parties on each side are found satisfying theorems which for the other school are either false, or senseless, or even in a way contradictory. In particular, theorems holding in intuitionism, but not in classical mathematics, often originate from the circumstance that for mathematical entities belonging to a certain species, the possession of a certain property imposes a special character on their way of development from the basic intuition, and that from this special character of their way of development from the basic intuition, properties ensue which for classical mathematics are false. A striking example is the intuitionist theorem that a full function of the unity continuum, i.e. a function assigning a real number to every non-negative real number not exceeding unity, is necessarily uniformly continuous (Brouwer 1964:79).

The remarkable fact about the history of mathematics is that, initially, within the school of Pythagoras, mathematics was arithmetized. The discovery of incommensurability (irrational numbers) caused a shift to space, reducing all of mathematics to geometry. During the latter part of the 19ᵗʰ century, Bolzano, Weierstrass, Dedekind and Cantor once again enthroned *arithmeticism* in mathematics. Nonetheless, both in the 20ᵗʰ and 21ˢᵗ centuries, trends emerged, once again considering space (geometry) to be the ultimate foundation of mathematics.

It is worthwhile to elaborate slightly on the past 130 years. In 1884, Frege still believed that the foundation of arithmetic is deeper than that of geometry.[7] Soon after that, he developed his logicist programme in a two-volume work on the fundamental laws of arithmetic (cf. Frege 1893, 1903). Yet, Frege's logicism ran into the inconsistency of the naïve concept of a set, discovered independently by Russell and Zermelo in 1900. They have

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7   "Liegt nicht der Grund der Arithmetik tiefer als der alles Erfahrungswissens, tiefer selbst als der Geometrie?" (Frege 1884:44).

shown that one merely has to consider a set C, which has as elements all those sets that do not have themselves as an element. Then it follows that C is an element of C, if and only if C is not an element of C. This discovery caused Frege to retire from his logicist programme, which, by the end of his life, led to his return to the Greek conception that mathematics, in an *a priori* sense, is geometry (1924-1925):

> So an a priori mode of cognition must be involved here. But this cognition does not have to flow from purely logical principles, as I originally assumed. There is the further possibility that it has a geometrical source. ... The more I have thought the matter over, the more convinced I have become that arithmetic and geometry have developed on the same basis – a geometrical one in fact – so that mathematics in its entirety is really geometry (Frege 1979:277).

More recently, Longo (2001:6) pointed out that the French mathematician, René Thom, and other mathematicians of the continuum, hold that "the continuum precedes ontologically the discrete", for the latter is "merely an 'accident coming out of the continuum background', 'a broken line'". Longo (2001:19) also remarked: "By contrast Leibniz and Thom consider the continuum as the original giving, central to all mathematical construction, while the discrete is only represented as a singularity, as a catastrophe".

Moreover, while non-standard analysis explores infinite totalities, smooth infinitesimal analysis (SIA) gives priority to the continuous as "an autonomous notion, not explicable in terms of the discrete" (Bell 2006:284; cf. also Bell 2006:18).

The remarkable perspective emerging from this brief historical survey is that mathematics constantly fluctuated between the one-sided extremes of an arithmetization and a geometrization, without exploring the third option derived from a non-reductionist ontology.[8] As noted earlier in connection with Milbank's idea of a Christian sociology, a key part of such a non-reductionist ontology is articulated in the theory of modal aspects that occupied our attention in various respects of our analyses thus far. Instead of reducing space to number or number to space, such an ontology suggests that one acknowledges the uniqueness and irreducibility of number and space (discreteness and continuity), while simultaneously investigating their mutual coherence.

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8   For a radical questioning of the arithmetization of mathematics, cf. Bernays (1976:188): "The arithmetizing monism within mathematics is an arbitrary thesis. That the field of investigation of mathematics solely derives from representations of number is not at all shown".

What Milbank, therefore, reluctantly considered to be a "silly" option, namely a Christian mathematics, is not that far-fetched after all. A more extensive account of the significance of a non-reductionist ontology for the discipline of mathematics is found in Strauss (2009a) and the possibility of a Christian mathematics, developed on the basis of a Christian philosophy, is discussed in Strauss (2003).

6. CONCLUDING REMARK

Unless theology acknowledges the necessity of a Christian philosophical ontology, it will constantly have to face states of affairs exceeding the reach of a theological treatment. Therefore, *Radical Orthodoxy* may benefit from taking into consideration the implications entailed in accepting God's law as the boundary between Creator and creation, as well as the distinctness of structure and direction, which opens up an appreciation for a non-reductionist ontology. Then the *altera civitas* could be liberated from a two-realm perspective and appreciated in the truly radical, total and central sense of the new humanity in Christ,[9] lying at the root of all issues and walks of life (Proverbs 4:23).

Neither philosophy nor theology is in a position to replace Christ's Kingship over all of life. Both philosophy and theology ought to be informed and directed by the radical and integral biblical basic motive of creation, fall and redemption. The theoretical idea of the cohering diversity within reality brings this radical motivation to expression and enables a Christian non-reductionist ontology that is philosophical in nature. Such a philosophy does not receive its Christian character from theology, for, in order to fulfil its special scientific task, theology, like every other modally delimited special science (including economics), will remain dependent upon a non-reductionist ontology, avoiding the deification of anything within creation. Moreover, such an ontology ought to be Christian in its own right and does not depend on a theological contribution in order to become Christian: "… the Christian contribution to, say, economics, is always a theological contribution" (Milbank 2004:14).

To the extent in which *Radical Orthodoxy* still adheres to the traditional Roman Catholic view that theology should perform a *saving role*, at once *preserving* and *fulfilling* philosophy (*gratia naturam non tollit*, *sed perficit*), it does not escape from confusing *structure* and *direction*, a confusion also present in its understanding of the *altera civitas*. Milbank *et al.* (2006:37) hold: "Therefore theology saves reason and *fulfils* and *preserves*

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9   Cf. Strauss 1972.

philosophy, whereas philosophy left to itself, brings itself, as Heidegger saw, to its own end".[10]

Ultimately, this article aims to consider the implications of the unity and goodness of creation, subject to God's kingdom rule over all of creation. Christians and non-Christians are not doing different things – they do the same things differently. Consequently, within the natural sciences and the humanities, Christian scholarship ought to bear witness to a distinct Christian position even in the apparently most exact sciences such as mathematics. Rejecting the possibility of a Christian mathematics as "silly" is, in fact, inconsistent with Milbank's plea for a "fully Christianised ontology" and his claim that there is no terrain or domain within creation that can be independent of God.

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10 Of course, appreciating reason should not be equated with rationalism as it is done in the modernism/postmodernism controversy, as affirmed by Pickstock (1998:48): "It appears that the modernism/postmodernism debate is empty shadow-boxing, since nihilism is but the most extreme expression of a humanist rationalism".

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