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By Tzuchien Tho , 19 June 2013

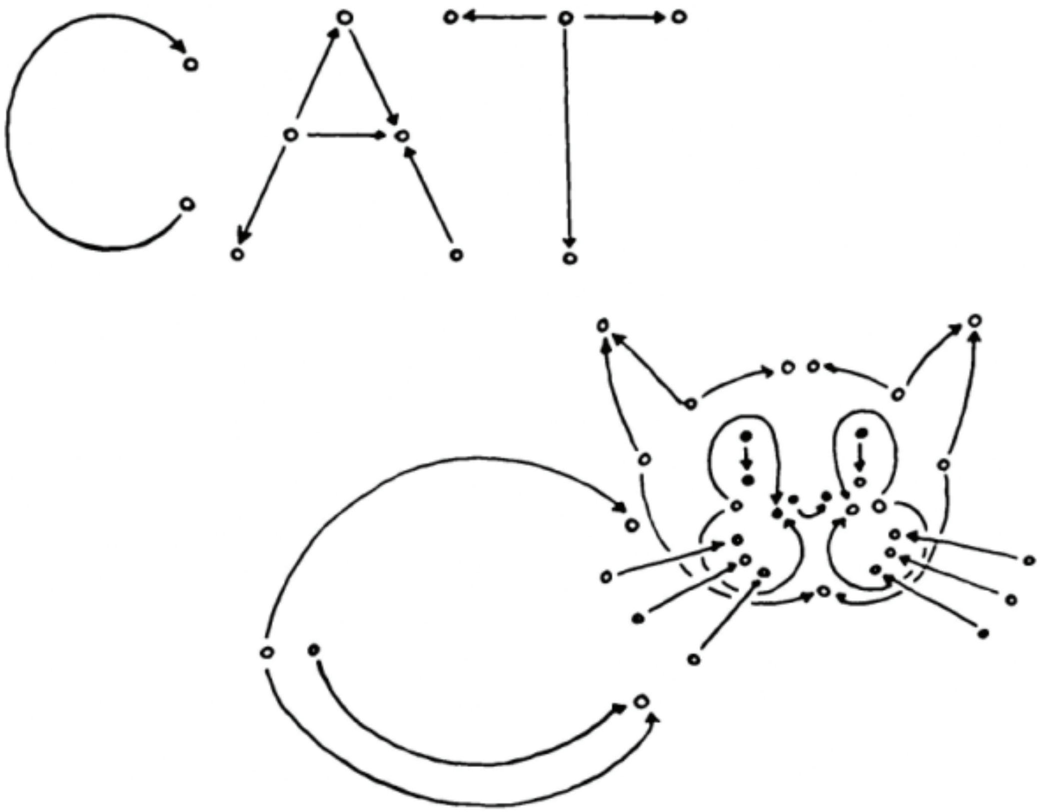

Image: 'Categorists have developed a symbolism that allows one quickly to visualise quite complicated facts by means of diagrams'

In his dense bomb of a book, Fernando Zalamea updates the relationship between contemporary mathematics and philosophy. What is proposed is a synthetic approach which works to unground ontology and epistemology, in the pursuit of multiple and transitive relations between ideas, things and rules. Review by Tzuchien Tho

Political philosophers often complain about the lack of ‘Post-colonial’ voices while seeming only to be interested in the influence of European thinkers like Lacan or Deleuze in, say, South Asia. Urbanomic (publisher of the journal *Collapse* and translations by Meillassoux and Laruelle) and Sequence Press have published a translation of Fernando Zalamea's *Synthetic Philosophy of Contemporary Mathematics*. Zalamea’s book, complete with formulae, diagrams and a network of unfamiliar references (De Lorenzo, Caicedo), represents just such a ‘Latin American perspective’ with nary a reference to his alleged ‘native concerns’.

The original Spanish edition of Zalamea's book (*Filosofia Sintética de las Matemáticas Contemporáneas*) was published in 2009, a synthetic philosophical treatise (in form and content) of the French and American trained mathematician (Paris IV Sorbonne and University of Massachusetts Amherst) who has, for many years, held a professorship in the department of mathematics at the National University of Colombia (Bogotá). This book, elegantly and clearly translated by Z.L. Fraser provides, for the Anglophone world, insight into his renewal of philosophy through mathematical (and synthetical) means.

Although we become familiar with Zalamea's own ideas through this translation, it is by no means the first time the name of this mathematician-philosopher has appeared in the philosophical presses. Working across Spanish, English and French, Zalamea has long been one of the main expositors of the work of Albert Lautman, the French *résistant* philosopher of mathematics (executed by the Nazis in 1944), more than a decade before the latter's complete works were even collected in French, in 2006 – an edition comprising a long introduction by Zalamea.[1]

Zalamea's work here is clearly indebted to Lautman's writings in the late '30s and early '40s but raises a problem of *philosophical* temporality larger in scale. That is, far from the Zizekian rejection of philosophy as dialogue, it is clear that ossification sets in when philosophical questioning becomes unmoored from a dialogue with its time. One would of course not wish to establish a strict correlation between the *relevance* of philosophy and contemporary *fashion*. Even a philosophy that is out-of-joint maintains this very position through a disjunctive act *against* a set of historical conditions. Banal as this must seem, this ossification is largely the state for the sub-discipline we call 'the philosophy of mathematics' and a denunciation of this sorry state is the given starting point of Zalamea's book.

Imagine if a political philosopher did not know about Bretton Woods or if a philosopher of physics had 'only heard of' quantum field theory. Zalamea's starting point is that mainstream philosophy of mathematics, which he perjoratively terms the 'analytic' philosophy of mathematics, remains tied to the origins of set theory developed in the late 19th century and that remained the central fulcrum mediating the rapport between philosophy and mathematics throughout the first half of the 20th century. Of course these mathematical developments across a half of a century are rich and various but they have been received in philosophy in a particular way. The means by which the problems of set theory were absorbed by philosophy during the period of the development of set theory (foundation problems, completeness proofs, debates about large cardinals, etc.) is undeniably a cogent example of the mutual meaningfulness of philosophy and mathematics. The problem arises precisely because this very reception of set theory into philosophy has placed philosophy in the ossification mentioned earlier, unable to move beyond this important although bygone conjuncture between mathematical invention and philosophical reception.

Zalamea's grief with so-called 'analytic philosophy' may be slightly overstated here. Although it is true the starting point of much of the discussion in the sub-discipline of the philosophy of mathematics is still sadly limited by the methodology of concept analysis and logical reduction, one can hardly meet a philosopher of mathematics who does not lament the sub-discipline's tardiness. Zalamea captures something that is indeed the guilt shared by almost all philosophers of mathematics. The deeper problem is not so much that the mainstream of the philosophy of mathematics ignores the mathematical developments in the second half of the 20th century, but rather that the questions being posed remain tied to earlier demarcations concerning realism and idealism in both the ontological and epistemological sense. That is, even if one holds a radically anti-logicist position, the means by which this very position gets articulated remains tied to an overcoming of this earlier currency-standard of discourse. Hence not only are the purportedly 'neutral' logical tools that prepare mathematical concepts for philosophical consumption inadequate but it is this inadequacy that precisely filters out the most crucial and important aspects of contemporary mathematics.

Zalamea prepares a different starting point (rather than an origin) for his ‘synthetic philosophy’. *In media res* of contemporary mathematics, Zalamea does not refute the standard logical paradigm for the philosophical evaluation of mathematics and thereby avoids, by a large measure, the trap of falling into the standards set down by the logicist paradigm. Rather, Zalamea marks a *ligne de fuite* (line of flight) through a theoretical act that would be incomprehensible from this standard methodology. Here he draws from the ‘pragmaticism’ of Peirce (‘a term ugly enough to the plagiarists’ as Peirce quipped and Zalamea faithfully recounts).[2] As employed by Zalamea, pragmaticism is capable of expressing the movement of mathematical thought without its reduction to any putative standard of objecthood or epistemological status. From basic mathematical signs to generalisable theorems, what is important, in avoiding reduction, is to dynamise the relations between mathematical practice, its conceptual products and the various possibilities for recombining these relations. The heart of Zalamea's philosophical contribution, more than the promotion of this anti-foundationalist dynamics between entity, relation and representation, is to show with what degree of insight this ‘incessant and concrete transit turns out to be one of the *specificity* of mathematical thought.’[3] A *synthetic* philosophy is then one that is also an *analytic* philosophy in its practice. An unfolding of a mathematical sign is then also its unfounding in that this very unfolding (or analysis) draws the sign and its place into a web of interrelations further and further away from its possible grounding. A mathematical concept turns out to be a group of transformations to which corresponds a series of expressions and also actions or gestures (in Gilles Châtelet's sense). As such synthesis is not unification in the reductive or abstractive sense but rather the mapping of a complex hierarchy of relations, one that lays bare multiple analyses through their interconnection.

Just as important as this pragmaticist philosophical point of departure, for Zalamea, is his emphasis on Alexander Grothendieck's (b. 1928) ground breaking work in mathematics. Zalamea provides a captivating sketch of Grothendieck not merely as a mathematician but as a thinker. Although Grothendieck can be understood as following in a long line of the most important mathematicians in the late 19th and 20th century (from Felix Klein, David Hilbert, Henri Cartan, Samuel Eilenberg, to Sanders Mac Lane), he made a major forward step by providing some of the first important results in the synthetic unification of algebraic topology and abstract algebra into what we call Category theory today. In non-technical terms, we can say that Grothendieck provides the first entry into a ‘general relativity’ of mathematics, what Zalamea describes as, ‘a web of incessant transfers, transcriptions, translations of concepts and objects between apparently distant regions of mathematics, and, secondly, an equally incessant search for invariants, proto-concepts and proto-objects behind that web of movements.’[4] The metaphor made to space-time relativity is also apt in describing the historical rupture introduced by Grothendieck and his generation in marking a separation in mathematics just as classical (Newtonian) physics, although still relevant to a certain scale of objects in physics, cannot compare to the complexity and scope of post-classical physics. Indeed, much of the advanced mathematics that Zalamea elaborates in his book concerns the legacy of Grothendieck in the work of mathematicians like Serre, Lawvere, Freyd and others. What this legacy carries out is precisely the synthetic promises of Grothendieck’s vision. In turn, Zalamea's own vision is then not only to see the Peircian dynamics of thought realised in the methodology developed in the wake of Grothendieck's work but to use the mathematical concretisation of this vision to renew philosophy itself.

Without entering into concrete discussion of advanced mathematics, we remain sadly far from shedding any real light on Zalamea's work here. Although this is an unfortunate fact of this review, a similar lamentation also describes Zalamea's own book. In the range of a hundred pages, Zalamea attempts to squeeze in a discussion of no less than twelve of the most important mathematicians of the last 60 years. Although it is clear that Zalamea has a concrete grasp of this massive body of knowledge and its interconnections, the sheer scope and complexity of this material cannot but leave even the most technically apt reader with only a vague grasp. A similar problem occurs with the philosophical aspects of the book. The centrality of Lautman and Peirce cannot escape the reader but Zalamea draws from such a wide catalogue of thinkers that readers are forced to hopelessly reduce their conceptual interaction with Zalamea to a few broad strokes; something tragically at odds with the ethics of his synthetic approach.

Perhaps one is meant to wander through Zalamea's book. There is no doubt that the book, whether as a whole or in sections, will require second and third readings. In this, Zalamea's editorial organisation of the book does provide some relief in providing a clear thematic organisation of his crucial steps. The book is divided into three major parts and each part into a number of chapters. The first part is a sketch of the state of contemporary 'advanced' mathematics and a significant critique of the contemporary philosophy of mathematics from the perspective of its inadequate grasp of the these important new developments. This section also includes a review or 'bibliographical survey' as Zalamea calls it, of different contemporary encounters between mathematics and philosophy from both sides starting with his favourite thinker, Lautman, to famous figures like Lakatos and Badiou but also lesser known figures like de Lorenzo, Châtelet and Patras. The second section consists of 'case studies' in synthetic thought, a section meant to concretise the crucial conceptual manoeuvres charted out in the first section. It begins with an account of Grothendieck's life and work followed by a classification (albeit a porous one) of three aspects of advanced mathematics and the mathematicians that might be classified under these three aspects.

Since Zalamea's project is based on a synthesis of Peirce, Lautman and Grothendieck, it is no surprise that these three aspects correspond to movements. The first aspect, eidal mathematics, corresponds to the movements of 'ascent' towards '*eidos*' or idea/form. The second aspect, quiddital mathematics, corresponds to movements of 'descent' towards '*quidditas*' or 'what there is'. The third, archeal mathematics, correspond to invariants (*arche* or principle) across these movements. The first eidal aspect roughly concerns the vistas offered by the development of advanced mathematics to develop a different strategy with which to rework traditional notions of universality, absoluteness and the continuity of mathematical practice as such. This ascent to the 'peak' in order to gaze down is perhaps best represented by Category theory's capacity to handle transformations across widely different structures. As a new kind of mathematical medium, it provides precisely the expressive capacities of these structural relations. If eidal mathematics is the view from above, the second quiddital aspect is the process of descent back to essences and existences in their mixed and oscillating representation of the physical world. Here the mathematical structures developed through the exigencies of post-classical physics are taken back into mathematics itself to reconfigure its limits. Finally, with all these incessant transits, what is revealed is also a new capacity to grasp invariants in a way that could not have been synthesised before. The key idea here is that invariance no longer implies notions of foundation, sub-*stance* or *stasis* but rather the dynamic and relative archetypal or proto-objectal *constructions*.

The book's final section draws the immediate lessons gained from such a rich approach. The first is the establishment of a 'transitory ontology', inspired by Alain Badiou's move from Set theory to Topos theory in the late '90s, where the ontological stakes of mathematics are revealed more through 'ceaseless transit' than any particular abstract or concrete register of discourse.[5] The second is the establishment of an epistemology that results from 'ontological fluctuation'. Using the concept of sheaves (and pre-sheaves) and their resulting structures, Zalamea provides a sketch of how to synthesise epistemological perspectives themselves. The third is a phenomenology of mathematical creativity that, through this ungrounded and mobile ontological and epistemological base, attempts to situate the polarising tendencies to ascribe either *invention* or *discovery* to the nature of mathematical development. Finally, Zalamea addresses the treasures that can be drawn from contemporary mathematics across thought in general, the 'general operativity of the TRANS', the rallying cry of the book itself.[6]

There is no doubt that any chapter of this book could be a book in itself and that the notion of a 'synthetic philosophy' could warrant a number of volumes merely focused on its philosophical unfolding. As such one could easily be dismissive in seeing this richness as a deep flaw of the book. There is simply too much. Indeed there is so much that multiple readings would still not be enough to grasp the concreteness of the philosophy-mathematics bridge that Zalamea wished to build. Due to this very richness there is also not enough. There is not enough focus on particular examples or patient exposition of key notions. Unlike predecessors like Leibniz, Euler, Weyl, Badiou and others who sought to present their philosophical positions in a mathematically didactic way, Zalamea has such an overwhelming number of complex examples ranging from the extensions of set theory, algebraic topology, categories and the mathematics of post-classical physics that one grasps only a fragment of Zalamea's own reasons for treating these examples. The very opposition to specialisation and theoretical neutralisation of important mathematical developments is certainly one of the central motivations of his writing but it would nonetheless leave most readers (at a distance from contemporary mathematics) stuck in uncomfortable corners. Even a keen student of Category theory who might grasp much of Zalamea's discussion of this aspect might find his rapid treatment of many of the other aspects of contemporary mathematics (like Connes' non-commutative geometry) disorienting.

As such Zalamea presents a book that is both too much and not enough. One needs to bring one's own ideas to contest the 'too much' and fill in the 'not enough'. In reading this text over numerous times, there is no doubt that Zalamea's brilliance shows through. What this text provides is a gesture, a manifesto, a hard push on the back. At the same time however a central problem, an endemic part of Zalamea's idea of synthetic philosophy, shows through. The effervescent enthusiasm of Zalamea's prose is contagious in transmitting the feeling of an enormous range of new possibilities that contemporary mathematics provides for thought but one is never fully sure of exactly why. To take an example, Zalamea's synthetic position is one that explicitly takes up the history of mathematics against the grain of Kuhn's means of reading scientific development through overlapping sequences of incommensurable paradigms. For Zalamea, oppositions between formalism, logicism, intuitionism and realism are useful for a synthetic perspective not because they make theoretical choices clear but because they provide methodologies that, once made explicit, provide the synthetic perspective with the very materials for articulating a methodological and conceptual web. At the same time however, Zalamea never ceases to speak of the new: new mathematics, new methods, new perspectives. The history of mathematics, as Zalamea keenly points out, is rarely, if ever, one of sharp paradigm shifts. A mathematician referred to again and again in this book is Leibniz, a thinker who brought about a mathematical revolution through the infinitesimal calculus by being rather conservative, placing emphasis on Archimedean methods and making explicit his disagreements with the 'modern' methods of Descartes.[7] As such 'the new' in mathematics is a highly qualified judgement; old methods meet with new results and new methods often justify established results.

There is thus a conceptual tension between the 'contemporary' and the 'synthetic' occurring in the title of the book. To be consistent, it appears that Zalamea should rather stick to the 'synthetic' side, articulating his position from the quasi-eternity of eidal mathematics. The 'new' and the 'contemporary' seem, then, merely indexical rather than conceptual.[8] The horizontal flattening out of mathematical concepts necessary to Zalamea's synthetic mathematics reveals a real tension between the temporality of mathematics and its synthetic articulation. This is one of the most interesting yet unresolved tensions in the book, one that will have to await further clarification by the author.

Tzuchien Tho <tzuchien.tho AT gmail.com> is Post-Doctoral Fellow at the Max Plank Institut fur Wissenschaftsgeschichte (Berlin) where he works on a project on the mathematical roots of Leibniz's Dynamics. He is also researcher at the Centre International d'Etude de la Philosophie Française Contemporaine where he runs a seminar on the intersections of the formal sciences (mathematics and logic) and 20th century French philosophy. He has published on themes related to the intersections

between mathematics and philosophy in the 17th and the 20th century.

Info

Fernando Zalamea, *Synthetic Philosophy of Contemporary Mathematics*, translated by Zachary Luke Fraser, Falmouth and New York: Urbanomic and Sequence Presses, 2012.

Footnotes

1 Albert Lautman , *Les mathématiques, les idées et le réel physique*, Paris: Vrin, 2006.

2 Fernando Zalamea, *Synthetic Philosophy of Contemporary Mathematics*, Z.L. Fraser (trans.), Falmouth and New York: Urbanomic and Sequence Presses, 2012, p. 112.

3 Ibid., p. 115.

4 Ibid., p. 141.

5 Ibid., p. 280.

6 Ibid., p. 364.

7 Of course whether Leibniz's methods are actually so different from Descartes is debatable. The issue is that Leibniz took himself to be conservatively correcting the excesses of the moderns. Cf. G.W. Leibniz, *Quadrature arithmétique du cercle, de l'ellipse et de l'hyperbole*, Marc Parmentier (trans. and ed.), Paris: Vrin, 2004.

8 Cf. Zalamea, p. 26.