

(neuro)plasticity, epigenesis and the void

ian james

POST-CONTINENTAL NATURALISM

What follows offers a close reading of Catherine Malabou's thinking of plasticity, neuroplasticity and epigenesis and attempts to discern the intimate relation of each of the instances to ontological groundlessness, that is to say, an experience of and exposure to what is here called, "the void." This reading of Malabou is part of a wider and ongoing project which examines the relation of science to philosophy in the work of four thinkers who might, broadly speaking, be characterized as "post-deconstructive": Malabou herself and also Jean-Luc Nancy, François Laruelle, and Bernard Stiegler.¹

This broader project arises more or less directly as a continuation of the arguments developed in *The New French Philosophy*.² In this work it was argued that a specific canon of French philosophers has emerged over the last three decades or so, rising to prominence from the 1980s and 1990s onwards. These philosophers explicitly distanced themselves from the linguistic paradigm that characterized the heyday of French structuralism in order to embrace innovative forms of realism and to align philosophy with, variously, a non-reductive naturalism, with the life-sciences, with mathematics and with a worldly materialist thinking. Now, as one reviewer of the book pointed out, this re-alignment is not entirely a decisive break, since a large amount of Deleuze and the late Foucault could arguably be characterized in these

terms.³ And, of course more generally, there are a number of specific trajectories in French thought that have been concerned with the sciences throughout the twentieth-century: from Gaston Bachelard, Georges Canguilhem and French historical epistemology in the mid-twentieth century through to the work of Michel Serres, Bruno Latour and many others in the last decades of the twentieth-century, including the work of French analytic philosophers. Nevertheless what is clear is that a number of the older philosophers that were engaged with in this book launched explicit polemics against the structuralist-linguistic paradigm as early as the 1970s, most notably Nancy, Laruelle and Alain Badiou, and that this shaped the development of their work into the 1980s and after. The decline of the related paradigm of writing or *écriture*, signalled explicitly in Laruelle's 1970s polemic which bears the title, *Le Déclin de l'écriture*, is a centrepiece of Malabou's later thinking of plasticity which will be of central concern here.

More generally, the relation of science to philosophy in Nancy, Laruelle, Malabou and Stiegler has arguably given rise to a mode of thinking that has emerged in the wake of this eclipse of the linguistic paradigm. This mode of thinking might potentially go by the name of "post-continental naturalism." This term is used, briefly and without any systematic development, in John Mullarkey's 2006 work *Post-Continental Philosophy: An Outline*.⁴ It may seem rather strange, if not entirely implausible, to give the name of naturalism to bodies of thought that have developed in the wake of Derridean deconstruction, for instance those of Nancy, Malabou and Stiegler. It is a little less surprising in relation to Laruelle's thought which has a close proximity to Deleuze, who, principally via his writing on Lucretius and Spinoza, has of course been associated with naturalism and who has, more broadly, been extensively aligned with scientific contexts. There is a strong tendency, with some notable exceptions, to characterize the general trajectory of phenomenological thought as distinctly anti-naturalist, and to associate this anti-naturalist tendency with the phenomenological legacy as it passed on into France from its German origins in post-Kantian transcendental philosophy and from the philosophies of Husserl and Heidegger in particular.

It may be worth pointing out that naturalism arguably has no very precise meaning within contemporary philosophy. In its broadest and most general form, of course, it can be characterised as thought which allies itself closely with science and holds that reality is exhausted by nature and specifically by nature as it can be known or investigated by the methods of the natural sciences. So, to be clear, naturalism therefore does not admit the existence of supernatural entities and, arguably, it is perhaps antithetical to the idea of a transcendental moment within thought, to a

priori structures of the mind which would be irreducible to the physical structure of the brain. Even at this most general level it is clear that naturalism implies a very specific relation between philosophy and science.

Perhaps one of most paradigmatic naturalist thinkers in this context would be Willard Van Orman Quine and it is worth reminding ourselves of the way in which the science-philosophy relation is configured in Quine's thought. In his short essay "Five Milestones of Empiricism" Quine argues that naturalism can be seen as the abandonment of the goal of a first philosophy, an abandonment which dictates that science alone is the primary mode of knowing and enquiring into reality.⁵ Science here would not be answerable to any non-scientific or supra-scientific tribunal or mode of justification. For Quine, therefore, philosophy is not prior to science and it cannot take priority over science, but is rather continuous with the scientific enterprise in general. Thus the authority of philosophy is constrained by, indeed subordinated to, scientific knowledge and cannot contradict or overturn that knowledge on purely philosophical grounds. So when in philosophy we pose, say, the ontological question of what can be said to exist or qualify for existence, Quine's naturalism would tell us that we need to refer, and to defer, to our current best scientific theories. This relation of philosophy to science is carried forward into, and is radicalised within, the contemporary context in the project of scientific metaphysics developed by figures such as James Ladyman, Don Ross and Harold Kincaid.

A guiding hypotheses here is that, if one can identify and sensibly come to talk about something like a post-continental naturalism, then such a naturalism will look very different from the image of philosophical naturalism sketched out above and will articulate a very different relation of philosophy to science.

The broader related contexts which are of interest in the bringing together of Nancy, Laruelle, Malabou and Stiegler under the rubric of post-continental naturalism are numerous and cannot be fully engaged with here. Names such as Bachelard, Canguilhem, Serres and Latour have already been mentioned. One might also mention the project of naturalizing phenomenology that has emerged in recent decades and specifically the neuro-phenomenology of figures such as Francesco Varela, or thinkers who have tried to combine phenomenological or ontological accounts of embodiment with cognitivist approaches, such as Antonio Damasio or Hubert Dreyfus. This context is of particular interest as a point of comparison and contrast to the naturalizing of post-phenomenological or post-deconstructive thought.

Perhaps the most important contemporary contexts or debates to which the emergence of a post-continental naturalism can be related are those concerning the post-Kantian turn within continental philosophy and the emergence of speculative realism as a distinct, albeit highly disputed, movement from 2007 onwards, and associated initially with the names of Quentin Meillassoux, Ray Brassier, Graham Harman and Iain Hamilton Grant. Quentin Meillassoux's, *After Finitude*, with its argument that philosophy should move beyond the Kantian and post-Kantian problematic of finitude, is of particular interest.⁶ As is Graham Harman's suggestion that speculative realism can be divided into two opposing groups: epistemist and anti-epistemist, the former group comprising Quentin Meillassoux and Ray Brassier and the latter comprising himself and Iain Hamilton Grant.⁷ What Harman's distinction rightly identifies is a difference of orientation with respect to mathematical and scientific forms of knowledge within speculative realism. On the one hand Meillassoux endorses a kind of mathematism when he claims in *After Finitude* that mathematics is able to describe those aspects of reality that are human-independent. On the other hand Brassier endorses a version of scientism, inspired by his interest in the thought of Wilfred Sellars, when, in *Nihil Unbound* and elsewhere, he privileges the scientific image of the world.⁸ In both cases mathematical or scientific thought are privileged insofar as they offer the possibility of moving beyond, or of stripping away, the finitude of human knowledge in order to approach and attain the reality of the world as it would be without humans. In Brassier's case his scientism leads him very much towards a form of naturalism that he has recently dubbed "critical naturalism" and which would allow philosophy, as the name suggests, to have a more critical relation to scientific knowledge. Harman and Grant conversely, in their "anti-epistemist" speculative-realist approach, hold that ultimate, human-independent reality is withdrawn absolutely from all thought, phenomenal appearance and therefore from scientific determination. So Harman, for instance, develops his distinctive object-oriented ontology using a mode of argumentation, by turns phenomenological and metaphysical, which is entirely divorced from scientific knowledge. What is important to note here is that speculative realism, in its attempt to move beyond the legacy of Kantian transcendental thought, has divided into wildly divergent positions which configure the relation of philosophy to science in more or less diametrically opposed terms, with the epistemist wing aligning the two closely and the anti-epistemist wing separating the two decisively.

Again a guiding hypothesis here is that the post-continental naturalism that is identifiable in the thought of Nancy, Laruelle, Malabou and Stiegler is decisively different from the orientations towards science one finds in the work of epistemist

speculative realists such as Meillassoux and Brassier. And, insofar as Nancy et. al. *do* engage with science at all, their thought also decisively differs from the anti-epistemist speculative realists Harman and Grant.

There are other thinkers who can be brought into dialogue with the specific engagements with science carried out within post-continental naturalism. So, for instance, Bruno Latour, Alfred North Whitehead and Isabelle Stengers are all of interest in this context. Gilles Deleuze would, most obviously and pre-eminently of course, figure in this regard. There is a large amount of thought and scholarship which interrogates the relation of Deleuzian thought to the sciences: most prominently perhaps Keith Ansell Pearson's works around the life sciences and technology, *Viroid Life* and *Germinal Life*, and Manuel DeLanda's ground-breaking *Intensive Science & Virtual Philosophy*.⁹

Nancy, Laruelle, Malabou and Stiegler all offer a different image of thought and philosophy from that given by Deleuze, despite certain proximities, particularly in the case of Laruelle. And with this different image of philosophy comes a different articulation of philosophy's relation to science.

PLASTICITY AND GROUNDLESSNESS

In the case of Catherine Malabou this difference can be seen in the very specific nature of her engagements with neuroscience, and more recently epigenetics, and in the way that she brings together insights drawn from empirical science with a philosophical elaboration of the concept of plasticity derived initially from Hegel. So, for instance, in works such as *What Should We Do With our Brain?* a dialectical but nonetheless post-deconstructive account of the formation, deformation, and reformation of material form, that is very much indebted to the post-Kantian transcendentalist tradition, is mapped onto the scientific phenomenon of neuroplasticity, that is to say, the formation and plastic development of the neural networks and interconnections of the brain throughout life.¹⁰ On this basis Malabou is able to rearticulate, in a highly original manner, a philosophical materialism which gives novel articulations of subjectivity, of freedom, and of the intersection between history and biology, consciousness and brain structure. Malabou's bringing together of post-phenomenological or post-deconstructive thought and contemporary neuroscientific knowledge is both original and powerful, but it is also deeply problematic. The obvious question arises as to whether philosophical plasticity as thought originally from a Derrida-inspired reading of Hegel is really compatible with the strictly empirical scientific concept of neuroplasticity. The

point is that neuroscience treats the brain as an object or thing, a thing whose activities can be objectively determined via magnetic resonance imaging and other technologies. In contrast, post-Kantian, phenomenological and post-phenomenological thought treats subjectivity, consciousness, and thought itself as no kind of thing, as that which, given its transcendental or quasi-transcendental conditions, cannot be objectified or reified and therefore cannot be treated in any way as simply another thing in the world of things. In *What Should We Do With our Brain?* and subsequent works, Malabou insisted that what is needed is a philosophical *interpretation* of neuroplasticity, but she did not really tackle or develop the problem of the relation of transcendental and empirical moments within plasticity head on, except at times to suggest some kind of dialectical or plastic relation between them. Her recent work on Kant and epigenesis in *Before Tomorrow* has however fully embraced this problem, placed it in the centre stage of her thinking, and related it explicitly to the wider stakes of contemporary philosophical debate that has been outlined here, particularly those of speculative realism and of Meillassoux's rejection of the post-Kantian transcendental.¹¹

And this is where my own questioning of plasticity, neuroplasticity and the void in Malabou's thinking begins. My argument is that what I am calling the "void," the experience of and exposure to ontological groundlessness, is what allows philosophical and scientific articulations of plasticity to be thought together. It is only with reference to an absence of ontological ground or foundation that something like thought—non-objectifiable, and never disclosable as a thing—can be brought and thought together with that thing or object that is the neurally networked brain.

As readers of Malabou's work will know very well, she aims to think plasticity in ontological terms as the mutability, transformability and exchangeability of being and of the material forms of existence. Plasticity, prior to any regime of meaningful or symbolic inscription, prior therefore to signification, *écriture*, or the Derridean trace, is fundamental, primordial or originary. Running slightly counter to Malabou's emphasis on plasticity's primordial status, it can be argued that there is, however, a yet more fundamental or primordial moment that must be admitted and articulated, that of the void or of ontological groundlessness. Malabou's plasticity is evidence of—it bears witness or testifies to—the void, the groundlessness, the abyss of being, and the void is always plasticity's most originary moment.

This may be surprising when taken in the context of Malabou's materialism, one which has consistently refused the notion of a gap or break between the regime of subjectivity, consciousness or thought on the one hand, and material, biological and embodied existence on the other. In her recent book on Kant, rationality and epigenesis, *Before Tomorrow*, Malabou asks: "why does philosophy continue to ignore recent neurobiological discoveries that suggest a profoundly transformed view of brain development and that now make it difficult, if not unacceptable, to maintain the existence of an impassable abyss between the logical and biological origin of thinking?"¹² This question reiterates Malabou's long-standing conviction that there is an ontological continuity between the neuro-biological or neuronal dimension of thought and the experience of thought itself as consciousness or as the lived subjectivity of mental life as such. She reiterates here the certainty that was so clearly articulated in *What Should We Do with Our Brain?*, namely the "certainty that there exists a perfect continuity between the neuronal and the mental".¹³ Does this then mean that there is no place at all for any conception of the void in Malabou's materialism, since there is no ontological breach between mind and body, and the perennial mind-body problem of philosophy is no longer pertinent? The absence of "an impassable abyss" between the logical and biological origin of thinking might well lead one to question where, after all, there *can* be a space or place for any kind of abyssal opening or vertiginous absence of ground within being when there is nothing but a seamless continuity between thought and matter.

And yet, what has been clear throughout the development of Malabou's thinking is her insistence that the continuity of the neuronal and the mental, the biological and the logical, should not in any way involve the reduction of the latter to the former. Nor should it allow for any kind of materialist or neuro-cognitive eliminativism, of the kind, say, proposed by Paul and Patricia Churchland, which would consign thought and the qualia of subjective experience to the realm of the illusory or the epiphenomenal. Malabou's thinking, therefore, *despite* its insistence on the strict ontological continuity between the neurobiological activity of the brain and the mental life of subjective consciousness, maintains a questioning of, and a philosophical engagement with, the transcendental origin and status of thought. As was indicated earlier, this conjugation of the neurobiological and the transcendental has been Malabou's implicit concern at least since the polemic of *What Should We Do with Our Brain?* and is the central preoccupation of her engagement with Kantian rationality and the problem of epigenesis in her most recent work *Before Tomorrow*.

The philosophical problem here, however, as was indicated earlier, is the fact that, as Malabou herself puts it: “the neurobiological viewpoint simply erases the transcendental”.¹⁴ Reductivism or eliminativism is eminently easy from the neurobiological viewpoint since it seemingly has no need at all to pose the transcendental question of the formation of reason and rationality. Nor, seemingly, does it need to account for the phenomenological problem of the transcendence of intentional consciousness towards a meaningful world. Malabou’s arguments against reductivism need not be rehearsed here, nor does her persuasive demonstration in *Before Tomorrow* of the philosophical inadequacy of any attempt to dispense with the transcendental moment within thought, either from the neurobiological or from other contemporary theoretical perspectives. What is important to note is that the void in Malabou’s thinking, the ontological groundlessness that is plasticity’s most originary moment, has its place insofar as it makes possible the intrication of biological life and the transcendental—the thinking together of the neuronal and the mental without any recourse to a breach, separation or split between mind and body.

In fact, notions of vacuity, negation, and void have been at the centre of Malabou’s thinking of plasticity from her earliest work on Hegel. In *The Future of Hegel*, Hegel’s own use of the German term “*plastizität*” is mapped onto the dialectical operations of subjectivity and its temporal experience, and, Malabou shows, the moments of vacuity, dissolution and annihilation are of central and paramount importance for the plastic character of the dialectical process. This is brought out most evidently in her reading of Hegel’s interpretation of divine kenosis, that process described in Paul’s Epistle to the Philippians, as Christ’s emptying out or voiding of his divinity as he becomes incarnate in flesh. Malabou notes the way in which for Hegel kenosis is the movement by which God, on becoming incarnate, places himself outside of himself and alienates himself from himself, and thus accomplishes his divine essence in the contingent body of Christ. This movement exactly mirrors the dialectical structure of Hegelian subjectivity and its transcendental origin, or, as Malabou puts it: “there is an essential and indissoluble rapport between the kenosis of the divine and the emptiness of the transcendental. Working his way from one void to another, Hegel brings to light the kenotic essence of modern subjectivity.”¹⁵ So transcendental subjectivity, in its plasticity and dialectical becoming, is, at the very beginning of Malabou’s philosophical trajectory, characterized as vacuity, as void.

Given the Hegelian context none of this should be in any way surprising, but it is interesting and important to trace the way in which the central place given to the

void in Malabou's understanding of plasticity develops in subsequent philosophical contexts and engagements. So in *Le Change Heidegger*, or *The Heidegger Change* as it is appears in its English translation, plasticity is recast for the first time in terms of an originary ontological mutability and transformability. Malabou demonstrates the way in which Heidegger's thinking of ontological difference and his destruction or overcoming of metaphysics testifies to the convertability of different regimes of being and to an understanding of being itself as a primordial economy of change, modification or exchangeability. What Heidegger's thinking shows us therefore is that "being is nothing ... but its mutability, and that ontology is therefore the name of an originary migratory and metamorphic tendency".¹⁶ Yet if being is nothing but its mutability, nothing but originary exchange, change and transformation, then it is, in an important sense, also and very simply nothing in and of itself. It cannot be named as substance and is necessarily without essence or ground. In the place of ground or substantial foundation there is only a void of groundlessness. It is this groundlessness that informs Malabou's thinking of the fantastic in philosophy that gives the subtitle to *The Heidegger Change*. For the originary ontological groundlessness or void makes it necessary that the site of being is not nameable as such by means of anything other than phantasmatic images, or as Malabou puts it: "The fantastic: the locus of originary (ex)change can only ever be invested with images. The concept falls forever short of it".¹⁷ So this fantastical character of ontology, the nameability of being only in the plastic and mutable phantasmatic image, means that originary being only shows itself in and as a series of masks, each succeeding the other, but nowhere in this succession does anything lie behind or beneath the mask itself. Originary exchangeability, change and transformation are *as such* only in and through this primordial absence or void of essence, substance or ground.

These considerations may seem to be rather abstract, and one might wonder whether being in Heidegger, like the Hegelian kenotic subjectivity, thought as an emptying out, or absence, of substance, can ever be understood as materiality, as the very real malleability and plasticity of material forms. Yet Malabou is at pains to point out that the exchangeability of being that she is trying to discern as the most originary economy of Heidegger's ontology always concerns the material real, our own material real and its capacity to change, to manifest itself differently in the destruction of old, and the emergence of new, material forms. Here the originary void, the transformability of phantasmatic images of being and the plasticity of material forms, beings and entities all need to be thought together.

And Malabou's conjugation of the biological phenomenon of neuroplasticity with the philosophical conceptions of plasticity and transformation drawn from Hegel and Heidegger achieves just such a thinking together. In *What Should We Do with Our Brain?* the dialectical, plastic subjectivity described by way of Hegel in the earlier work is recast as the plasticity of the neuronal self, the self that emerges, and that is articulated in and through, the formation of neural connections and networks within the brain. Here brain plasticity is that capacity of neural networks to receive and to give form, to be formed, deformed, and reformed throughout the life of the brain in its ongoing interactions with its surrounding environment and world. The neuronal self, Malabou argues, drawing on the work of neurobiological thinkers such as Antonio Damasio and Joseph LeDoux, is mapped only in the material structure of its neural connections and networks and, according to the properties of life-long neuro-plasticity, it is "structured by the dialectical play of the emergence and annihilation of form".¹⁸ Yet for all its biologically determined physicality the neuronal self here is no less ungrounded and exposed to a void of substance or being than is Hegel's kenotic subjectivity, or Heidegger's originary economy of ontological mutability and exchange.

And this is where things become particularly difficult and complicated in Malabou's thinking. For she needs to find some way of articulating the ontological continuity between what are, after all, two very different registers: that of biological and neurobiological physicality, on the one hand, and dialectical or phenomenological subjectivity on the other. Or, put another way, an ontological continuity needs to be articulated between one register which erases the transcendental and another which requires it. And it is here that Malabou nevertheless uses the language of *discontinuity*, of rupture, breach, and abyssal opening, and it is precisely *here* that the place of the void can be discerned once more. For if the neuronal and the mental, in their ontological continuity, nevertheless necessarily remain as two distinct registers, then the continuity at stake here is by no means a seamless continuum. Malabou writes: "Only an ontological explosion could permit the transition from one order to another, from one organisation to another".¹⁹ And, she continues: "This explosive and formative effect corresponds to the transformation of one motor regime into another, a transformation necessitating a rupture, the violence of a gap that interrupts all continuity,"²⁰ concluding finally: "one might suppose, at the very core of the undeniable complicity that ties the cerebral to the psychical and the mental, a series of leaps or gaps."²¹

This might sound rather like a straightforward reintroduction of the mind-body split, an acknowledgement that, whatever neuroscience might tell us about

the undeniable complicity of the cerebral and the psychical, there will always necessarily be a gaping chasm or opening between them. But this is not so. Rather than a breach between two distinct ontological realms, the substance of physical and biological form, on the one hand, and the ideality or transcendence of thought on the other, what is at play here is the groundlessness, abyssal opening, or ontological void that subtends both instances and which makes possible the play of transition or transformation from one to the other. The ontological groundlessness of both the neuronal and the mental indicates that neither are self-sufficient substances in themselves. Both are articulated only in their relationality and the relation of transition, transformation or exchange from one to the other is made possible by the material spacing, differentiation and singularization that ontological groundlessness makes possible in the first instance.

The role of ontological groundlessness in thinking the mutual intrication of the neuronal and the mental is made much more explicit in *Before Tomorrow*. Here epigenesis, as thought from the biological perspective, and the epigenesis of reason, as thought by Kant, are brought together in much the same way as biological neuroplasticity and Hegelian plasticity are brought together in *What Should We Do with Our Brain?* Here it is worth reminding ourselves that within biology neuroplasticity is a specific manifestation of epigenetic development. Epigenetics in general studies the way in which the information contained in the genome is translated into the form and behaviour of a biological organism specifically taking into account the role of environmental influences and biochemical mechanisms which affect morphological and behavioural development without changing the DNA sequence itself. So neuroplasticity must be understood as the development of neurons, synapses, and neural interconnectivity in general, under the influence of biochemical and environmental factors which supplement and interact with the expression of genes leaving the gene sequences themselves intact.

The most striking and original achievement of *Before Tomorrow* is to argue that the epigenetic paradigm needs to be considered as a new form of the transcendental. In a complex and wide-ranging reading of Kant's thinking about the epigenesis of reason in the first *Critique*, Malabou argues that the transcendental moment of thought should no longer be understood in terms of a strict *a priori* of logical invariance or predisposition towards logical or categorial structure. Rather, the *a priori* structure of thought must be understood as being folded into the temporal and material becoming of epigenetic development and specifically that of neuroplasticity. But what this means, of course, is that the logical and categorial structure of thought, as folded into epigenetic becoming, formation

and articulation, has no timeless, transcendent or fixed essence or ground. Once again thought is shown to unfold in and as an absence of ground, or as Malabou puts it: “There is an epigenesis of reason because the a priori has no meaning. Rationality engenders itself—invents its forms—out of this necessary lack.”²² The absence of a timeless or transcendent ground within thought is central to the thinking of the epigenetic transcendental in *Before Tomorrow* and is explicitly affirmed on a number of occasions. So epigenesis is, for instance, “the origin born of the lack of origin, the lack of meaning of the origin.”²³ Yet this is not to be understood in privative terms, since “the absence of a foundation is a resource and not a lack,” and indeed, “it is perhaps the resource of absence that defines the transcendental,”²⁴ leading finally to the conclusion that “the transcendental is not based on anything” (*le transcendental ne repose sur rien*).²⁵ Malabou’s singular achievement here is to argue that an absence of foundation or ground is by no means an absence of reason and that, on the basis of an ontologically groundless biological epigenetic process, reason can find its form.

Arguably, the conjugation of the neuronal and the mental which was first elaborated in *What Should We Do with Our Brain?* finds here its most philosophically developed and accomplished form. The bringing together of neuroplasticity and Hegelian subjectivity is superseded by the co-articulation of a biological and philosophical reinterpretation of epigenesis and of epigenetic temporal becoming. And once again the ontological void finds its place, here as the most originary condition or resource of epigenetic plasticity, allowing epigenesis to be reformulated as the transcendental moment within a strictly biological account of the origin of thought and reason.

SCIENCE AND THE VOID

At this point a decisive question might be posed. It is clear that the affirmation of ontological groundlessness is eminently possible in the context of certain philosophical interpretations of Hegel and Kant, and arguably expedient in any interpretation of Heidegger. But is it philosophically compatible with the epistemological and ontological commitments implicit in neurobiological or more generally scientific discourses? Is there really a place for the void in biology and within the broader scientific worldview?

The answer is a plausible “yes” and, in fact, even the most hard-nosed of contemporary scientific metaphysicians are able to acknowledge that science does not furnish us with an ontology which can be firmly grounded in notions

of substance, essence or any other foundational moment. I am thinking here, by way of example, of the Ontic Structural Realism defended by James Ladyman and Don Ross in their 2007 work *Every Thing Must Go* and in the wider contemporary project of scientific metaphysics in which they and their colleagues are engaged.²⁶ Following and radicalising the naturalist primacy accorded science I described earlier, Ladyman and Ross argue that metaphysics must be guided exclusively by what fundamental physics tells us is the case about the universe. Their overtly scientific position suggests that all metaphysical thinking that is not so guided and also constrained by fundamental physics should be abandoned. They refer specifically in their polemic to analytic metaphysics and do not even mention the continental tradition which, one would imagine, they would dismiss out of hand. Yet even from this position of extreme scientism Ladyman and Ross argue that all science can know of being is structure and relations, and that structure and relations are determined ultimately and solely as the information that they bear or articulate. Citing physicists such as Jeffrey Bub, Anton Zeilinger and John Archibald Wheeler, Ladyman and Ross argue that information, understood in the Shannon-Weaver sense of the term, is *the* fundamental category according to which physical reality can be known or determined and that information may ultimately come to be “regarded as primitive in physics” and “in some sense be all there is.”²⁷ As they also point out, information is an abstract mass noun; it does not designate substance or essence nor any substantial entity or thing. This has led Ladyman and Ross elsewhere in their collaborative writing explicitly to deny that there is any convincing basis at all for believing that a “ground of things” exists as such. Ontic structural realism, then, is very much a thinking of ontological groundlessness insofar as it thinks the being of the universe only in relational terms and as information.

One could cite scientist-philosophers such as Bernard d’Espagnat who have interpreted quantum theory in similar terms, but perhaps more pertinent, given Malabou’s engagement with neuroscience, would be to pose the same kind of question in relation to biology rather than physics. The biological thought of Georges Canguilhem is perhaps especially pertinent here. Intriguingly, Canguilhem is cited twice in *Before Tomorrow*: at the beginning, by way of an epigraph, and in a subsequent footnote.

The interest in reading Malabou alongside or through the thought of Canguilhem lies in the fact that he develops a purely relational theory and ontology of biological individuation. Plasticity in Malabou, understood as a fundamental order of transformation, mutability, and exchange, needs necessarily to be

understood in relational terms or again as a purely relational ontology—there is plastic transformation because one instance or form of material existence in some way relates to another in the very plastic process of transformation itself.

Canguilhem's understanding of biological individuation is developed in a diffuse way across a range of his writings, most notably perhaps in essays collected in the 1952 work *Knowledge of Life*.²⁸ His thinking here develops in the context of reflections upon the history of cell theory and upon the relation between organisms and their environment. It is succinctly expressed in the following quotation from the essay "The Living and its Milieu":

From the biological point of view, one must understand that the relationship between the organism and its environment is the same as that between the parts and the whole of an organism. The individuality of the living thing does not stop at its ectodermic borders any more than it begins at the cell. The biological relation between a being and its milieu is a functional relationship, and thereby a mobile one; its terms successively exchange roles. The cell is a milieu for intracellular elements; it itself lives in an interior milieu which is sometimes on the scale of the organ and sometimes of the organism; the organism itself lives in a milieu that, in a certain fashion, is to the organism what the organism is to its components.²⁹

Here we have a model of biological individuation in which there are nothing but relations within relations, within relations: for instance, diverse biochemical processes and their relations to molecular microstructures that in turn form intracellular structures, such structures then functioning in relation to the cell, those of the cell to the organ, of the organ to the organism, and of the organism to its environment. It is essential to note that for Canguilhem, the biological functional relations he describes should not be understood as relations between already existing entities but always as "relations to," that is, as a relation of one point in a structure to another point which, in relating, constitutes the entity as such in both its interiority and exteriority.

In this context it is equally essential to note that for Canguilhem, such a "relation to" is understood as a sense or meaning: the French term is "sens," and that "sens" in his thinking takes on a fundamental ontological status. He defines "sens" as follows: "From the biological and psychological point of view, sense is an appreciation of values in relation to a need. And for the one who experiences

and lives it, a need is an irreducible, and thereby absolute, system of reference.”³⁰ Biological functional relations here, understood as “relations to,” constitute biological entities or organisms as a “sens,” where “sens” must be understood axiologically as a system of reference experienced and lived in such a way as to centre the entity and individuate it as such, as a discrete and autonomous value. In this way the biological entity is both fully relational and fully individuated out of its relations, and at the same time its individuality nevertheless has a fundamental ontological status. This leads Canguilhem to argue that “the being of the organism is its sense.” To live, for Canguilhem, is to organise a milieu according to a centre of reference constituted out of “relations to,” but as a need or lived sense this centre of reference becomes absolute and irreducible or ontologically self-subsistent.

Canguilhem’s purely relational ontology of biological organisms, where being is only *as* the “relation-to” of sense, is no more amenable to the idea of ontological foundation or ground than is Ladyman and Ross’s Ontic Structural Realism. As has been suggested, Malabou’s neurobiological account of plasticity, articulated as it is within a necessarily relational ontology, is particularly susceptible to further development in relation to Canguilhem’s thought. As was suggested earlier, the possibility of transition and transformation of the neuronal to the mental in *What Should We Do With Our Brain?* turned on the ontological groundlessness of both instances. The ontological explosion between the neuronal and the mental, the series of leaps or gaps between them and across which they relate to each other are, remember, not a traditional mind-body gap but rather the void of being or substance to which both instances are exposed and which makes the relation and transition of one to the other possible. If, following Canguilhem, we understand the physical organisation of biological structure *and* the worldly or environmental directedness of the individual organism as both equally articulating ungrounded relations of *sense*, then the ontological continuity of both the neuronal and the mental is confirmed. What we call thought, consciousness, subjectivity, self-awareness, or the logical or categorial structures of reason are all of the order of sense understood as “relation-to,” and are therefore in an ontological continuum with the relations of sense that organise the biological genetic and epigenetic formation of organisms. And relationality here, as the material spacing, genesis and epigenesis of biological structure, and the meaningful directedness of an organism to its world, occurs always and only in and through the void, the absence of origin within being.

The epigenetic transcendental, Malabou writes, must be understood as “hermeneutic latitude, the power of *sense*, opened in the heart of the biological”.³¹

In so doing she has posed a major challenge to all neurobiological thought that is committed to reductivism and eliminativism and the rejection of the transcendental moment within thought itself. Her thinking also shows, it has been argued here, that the void necessarily has its place, both in the neurobiological and the philosophical perspective and in the possibility of bringing the two together. By this reading, the opening of a hermeneutic latitude or power of sense at the heart of the biological requires plasticity to be thought and elaborated within the context of a purely relational ontology which would be co-articulated with a primordial absence of ontological foundation or ground.

Malabou's next project is to develop further the thinking begun in *Before Tomorrow* through an interrogation of the symbolic dimension of biological life. The argument outlined here can be more thoroughly developed both in relation to Canguilhem's biological philosophy of sense and in relation to Jean-Luc Nancy's thinking of sense and world, as developed in texts such as *The Sense of the World*, and his philosophical elaboration of ontological groundlessness in Kantian critical philosophy developed in the 1988 work *The Experience of Freedom*.

By way of conclusion, it should be emphasised that what is at stake in this reading of Malabou, and the broader synthetic reading of Malabou, Nancy and Canguilhem in which it can be situated, is the possibility of placing the qualitative experience of thought and consciousness and the purely physical and bio-chemical processes of life and living organisms on the same ontological footing. To reiterate: the life of subjective consciousness, perception, thought and experience interrogated by transcendental philosophy, phenomenology, and post-phenomenological thinking is to be understood in the same terms as the material, objective, bio-chemical and physical structures known to science: namely as an order of ungrounded and relational sense. There is no ontological separation here between the material structure of life and the physical processes that govern it on the one hand, and the qualitative experience of the living organism's interaction with its material milieu on the other. Both are and are lived as relational sense.

This is important because there is a tendency of much scientific or scientific thinking to be reductionist or eliminative with regard to qualitative experience, subjective consciousness or mental states. So, for instance, in the case of the rather extreme scientism of Ladyman and Ross alluded to earlier, not only do they deny the objective existence of independent things or entities at the metaphysical level—hence the title of their work *Every Thing Must Go*—they also deny the existence of the qualia of first person perceptual experience. For Ladyman and

Ross, the notion of a quale of sense perception is an idle metaphysical category, referring to an illusory subjective epiphenomenon which must give way to a more scientific and objective measurement of what my physical brain is doing when it experiences the colour of the carpet and walls around us. Similarly, the eliminative materialism of the likes of Paul Churchland claims that a large number of the mental states that we believe we experience, states such as belief, desire, pain, and again qualitative perceptual experience, do not really exist as such and can only be judged or endowed with existence according their neural basis or how well they reduce to the level that can be known or observed by science.

Broadly speaking, for those of us working in the arts and humanities, and within large swathes of the social sciences, the reductivism that can be identified in mainstream naturalism, scientism, and areas such as eliminative materialism, or perhaps even cognitive science and evolutionary psychology, is difficult to accept or endow with any theoretical or philosophical credence. Indeed, for those disciplines which have qualitative, non-scientifically objectifiable experience as their principle subject of enquiry—aesthetic experience, symbolic experience, collective social and cultural experience, and so on—scientific reductivism or eliminativism may border on an absurdity.

The category of sense that has been introduced here by way of Malabou's recent work on epigenesis and in relation to Canguilhem's biological philosophy is in essence a purely speculative (and not at all a scientific) category. As indicated earlier, this idea will be developed much further elsewhere in relation to Jean-Luc Nancy's thought.³² In many ways it is, along with the idea of ontological groundlessness or void, a key hinge around which something like a post-continental naturalism can be seen to turn. Sense emerges in Nancy out of a purely philosophical trajectory of thought, through the contexts of Kantian and post-Kantian thought, phenomenology, existential ontology and deconstruction. In Malabou, as has been shown, it emerges in the conjuncture of post-deconstructive and biological accounts of plasticity and epigenesis. In Canguilhem it emerges in the context of lengthy speculative and philosophical reflections upon and interpretations of the history of cell theory and the relation between organisms and their environment. And here, by way of a final conclusion, something of the relation of philosophy to science in this context can be articulated. For if something like a philosophical naturalism can be identified in Nancy and Malabou, with a little help from Canguilhem, then it is not a naturalism according to which philosophy is exactly continuous with or subordinate to scientific knowledge or what our best theories dictate at any one time we can know of reality. Rather,

this post-continental naturalism would locate itself at a certain limit point of both philosophical and scientific thought, the speculative moment that arises and necessarily imposes itself when both philosophy *and* science come to the limit of what they can currently or constitutively determine of being. The experience of limits, of ungraspable finitude, indeterminacy, and of metaphysical exhaustion is central to the philosophical tradition of “French theory.” It could be questioned whether most scientists working at the cutting edge of quantum mechanics, cosmology, and the life sciences, for instance, would not readily admit the need for a speculative moment within their activity when they move beyond what is known to develop concepts which might advance their research. It is in the experience of, and encounter with, the limits of thought and knowledge that we perhaps come closest to the intuition or experience of ontological groundlessness. And it is here that speculation becomes necessary and that concepts such as sense that can bridge the gap between qualitative, subjective experience and quantifiable objective reality become useful. To this extent it may be that if something like a post-continental naturalism within contemporary French thought can be identified, it will necessarily also be a speculative naturalism.

NOTES

1. Ian James, *The Technique of Thought: On Post-Continental Naturalism* (forthcoming 2018).
2. Ian James, *The New French Philosophy*. Cambridge: Polity, 2012.
3. Todd May, *French Studies: A Quarterly Review*, 67:1 (2013, 136).
4. John Mullarkey, *Post-continental Philosophy: An Outline*. London: Continuum, 2006.
5. W. V. Quine, "Five Milestones to Empiricism" in *Theories and Things*. Cambridge MA.: Harvard University Press, 1981, 67-72.
6. Quentin Meillassoux, *After Finitude: An Essay on the Necessity of Contingency*. Trans. Ray Brassier. London: Continuum, 2010.
7. Graham Harman, "The Current State of Speculative Realism," *Speculations: A Journal of Speculative Realism*, 4 (2013, 23).
8. Ray Brassier, *Nihil Unbound*. Basingstoke: Palgrave Macmillan, 2006.
9. Keith Ansell Pearson, *Viroid Life*. London: Routledge, 1997; *Germinal Life*. London: Routledge, 1999; Manuel DeLanda, *Intensive Science & Virtual Philosophy*. London: Continuum, 2002.
10. Catherine Malabou, *What Should We Do with Our Brain?* Trans. S. Rand. New York: Fordham University Press, 2008.
11. Catherine Malabou, *Avant Demain: Epigénèse et rationalité*. Paris: Presses Universitaire de France, 2015; *Before Tomorrow: Epigenesis and Rationality*. Trans. Carolyn Shread. Cambridge : Polity, 2016. References will be made to the original French edition followed by a reference to the English translation.
12. Malabou, *Avant demain*, 2; *Before Tomorrow*, 1.
13. Malabou, *What Should We Do with Our Brain?*, 55.
14. Malabou, *Avant demain*, 262; *Before Tomorrow*, 152.
15. Catherine Malabou, *The Future of Hegel*. London: Routledge, 2004, 111.
16. Catherine Malabou, *The Heidegger Change*. New York: State University of New York Press, 2012, 270.
17. Malabou, *The Heidegger Change*, 71.
18. Malabou, *What Should We Do with Our Brain?*, 72.
19. Malabou, *What Should We Do with Our Brain?*, 72.
20. Malabou, *What Should We Do with Our Brain?*, 73.
21. Malabou, *What Should We Do with Our Brain?*, 75.
22. Malabou, *Avant demain*, 169; *Before Tomorrow*, 98.
23. Malabou, *Avant demain*, 170; *Before Tomorrow*, 98.
24. Malabou, *Avant demain*, 180-81; *Before Tomorrow*, 105.
25. Malabou, *Avant demain*, 271; *Before Tomorrow*, 157.
26. James Ladyman and Don Ross, *Every Thing Must Go*. Oxford: Oxford University Press, 2007.
27. Ladyman and Ross, *Every Thing*, 186.
28. Georges Canguilhem, *Knowledge of Life*. Trans. Stefanos Gerolanos and Daniela Ginsburg. New York: Fordham University Press, 2008.
29. Canguilhem, *Knowledge of Life*, 111.
30. Canguilhem, *Knowledge of Life*, 120.
31. Malabou, *Avant demain*, 153; *Before Tomorrow*, 89.
32. See note 1 above.