The Notion of 'Singularity' in the Work of Gilles Deleuze

Borum, Peter

Published in:
Deleuze Studies

Publication date:
2017

Document version
Publisher's PDF, also known as Version of record

Citation for published version (APA):
Borum, P. (2017). The Notion of 'Singularity' in the Work of Gilles Deleuze. *Deleuze Studies*, *11*(1), 95-120.

The Notion of 'Singularity' in the Work of Gilles Deleuze

Peter Borum University of Copenhagen

Abstract

In Deleuze, singularity replaces generality in the economy of thought. A Deleuzian singularity is an event, but the notion comprises the effectuation of the event into form. The triptych *émission–distribution–répartition* itself distributes the dimensions of the passage from form-giving event to topological morphology. The Deleuzian concept of intensity allows thinking both pre-individuality and the rhizomatic connection of singularities on the metaphysical surface of structure. Reflections upon the philosophy of differential calculus allow for a coherent scaffolding reaching from pre-individual intensity to specific individuality, in the passage from transcendental genesis to empirical morphogenesis. But if singularity as event is intensive, singularity as determinant of morphology – and hence, of structural metastability – is not. Although the differential scaffolding covers both intensive difference and extensive equality, and so the two sides of the notion of singularity, the concept of intensity remains slightly displaced, rendering conceptually difficult not only the perception of intensity, but also the contemplation of individual duration, if viewed in the terms of genetic 'indi-drama-differen*t*/*c*iation'. The essay concludes that it is art that may let us consciously contemplate our pre-individual differences.

Keywords: singularity, intensity, differential calculus, individuation, event, form

Deleuze Studies 11.1 (2017): 95–120
DOI: 10.3366/dls.2017.0253

www.euppublishing.com/dls

I.

In the work of Gilles Deleuze, the notion of 'singularity' is pivotal. It supplants generality in the pre-conception (or 'image') of thought: what is thought, is thought singularly (singularly, and so not generally); the beginning of *Différence et répétition* states that '[i]f repetition exists, it expresses at one and the same time a singularity against what is general [*contre le général*], a universality against what is particular [*contre la particularité*]' (Deleuze 1997: 9).[1] If the universal logically applies to all, the particular applies to only some (in the sense of not-all), whereas the singular applies to one, and only one, while the general, finally, applies to some (only this time in the sense of not-one, but several). A logical, and more basically a semiotical, square. Deleuze's *parti pris* is in favour of the entire axis of contraries (the universal vs. the singular), discarding the relevance of the subcontraries (the general vs. the particular). But the notion of singularity also serves to articulate the concept of repetition: 'singularity' pertains to what happens, that is: to the event.[2] As an event, the universal is once, and for all, while the singular is once, and for one; in that sense, the universal, in Deleuze, is a singular repetition which pertains to all.[3] Now, what is repeated, in Deleuze, is different-in-itself, so that 'singularity' must mean something different-in-itself, just as difference-in-itself conversely has to be singular in order to be a positive differing, and no negation.

When introduced, in *Différence et répétition* and in *Logique du sens*, the notion of 'singularity' forms part of a triad, together with 'pre-individual' and 'impersonal'. This triad has its roots in Deleuze's critique, or rather transvaluation, of 'the classical image of thought'. *Logique du sens* seeks to inscribe Russell's logic and Husserl's phenomenology in a 'transcendental field', which at one and the same time constitutes their ultimate condition of possibility and reduces the relative extent of their conceivable applicability by greatly enlarging the world of which they speak, so that, like Peirce (and thereby Kant) in the two books on cinema, they almost come to look like interesting prolegomena to the study of Bergson. The third series – 'of the proposition' – in turn denies that either of the three 'distinct relationships within the proposition' (Deleuze 1973: 22), 'signification', 'manifestation' and 'designation or indication' (22), may found the relationship of a proposition to the event which constitutes its sense. 'Signification', or 'the word's relationship to *universal or general* concepts' (24), is unable to do this, since any logical concluding which is done, on the one hand points to the actual designations or

indications of the significations of the premisses (in Husserl's terms, they must not stay purely 'formal', but be 'transcendental', that is: expressing the unitary ground of experience, and so presupposing the community of meaning of the logical forms in question[4]), and on the other hand multiplies their presupposed propositions *ad infinitum*. However, 'designation or indication', indicating an '*individuated*' (22; Deleuze underlines) state of affairs, is only made possible by the relationship of 'manifestation' (23), or the 'relationship to the speaking subject expressing itself' (23). This is because there has to be a subject which designates the state of affairs in question as equivalent to its own beliefs about it (hence the notion of the subject's 'manifesting' or 'expressing' itself). However, the form of the subject's beliefs, as well as the stability of their coincidence with the state of affairs in question, both presuppose the (general) form of signification: this (signification) is what I (manifestation) believe that (designation) to be. In short: indication of individuated states of affairs presupposes meaning, as a function of the 'desires' and 'beliefs' of the speaking subject passing judgement on the identity of the object of designation,[5] but this in turn tacitly presupposes the self-identity of signification, in language (25–6), taking us back, in logic, to actual designation. So we have come full circle. Where Russell talks about the proposition's 'significance' as 'its capacity for *expressing* a belief and for *indicating* a fact', acquiring 'the latter through the former, and the former through the meanings of its words' (Russell 1966: 210), we see that Deleuze systematically dissolves any such unequivocal logico-linguistic grounding of designation in manifestation in signification. It may be that signification would be a kind of ground in itself, but only inside of language. And as an ideal, self-identical phenomenon, signification's form falls under Deleuze's transvaluation of Husserlian notions in the same *Logique du sens*. Following Sartre, and the *Transcendance de l'Ego*, the fourteenth series – 'of double causality' – argues that the subject must 'always be constituted' (Deleuze 1973: 132), rather than being itself constitutive of anything.[6] This presupposes an impersonal transcendental field, constitutive of subjectivity, and of its representations. Now, as for the possible forms of the conceptual representations constituted through this field, both 'generality' and 'universality' only characterise (and Deleuze underlines) '*signified* classes and objective properties' (132), whereas any 'designatable systems, *individualised* in an objective manner' (132) only refer to 'subjective points of view that are themselves *individuating* and *designating*' (132). Finally, the 'personal form' of any transcendental synthesis of apperception, performing the predications of generalities

upon individual objects = X, or objects-whatever, is only characteristic 'of a subject that *manifests* itself' (132). So, to Deleuze, the vicious circle of Russell's logic is but a repetition of the too-extrinsic[7] theatre of possibilities in criticist and phenomenological representation, with manifestation corresponding to the active synthesis in the personal form, designation corresponding to the individual object = X of predication, and signification corresponding to general predicates. To the author of *Logique du sens*, this triple dead end of active personal synthesis, individual objects-whatever and general predicates is the point where, within the framework of a transcendental field, the 'idea of singularities, that is: of anti-generalities, which are, however, impersonal and pre-individual, must [...] serve as a hypothesis for the determination of this domain and of its genetic power' (133).

II.

But as there are, according to Deleuze, two sides to the event – what is and what is not effectuated[8] – there are also two sides to the notion of singularity. This mutual difference corresponds to the one between Aristotelian and Stoic logic, which Carlo Diano has proposed to resume as the difference between 'form' and 'event' (cf. Diano 1994). As is well known, the syllogism of Aristotle expresses the inherence of a predicate in a subject, whereas the syllogism of the Stoics expresses the connection of events: *Prior Analytics* thus start out by affirming that if 'human' does not belong to some 'animal', it does not follow that 'animal' does not belong to some 'human'[9] (all a question of genera and species), while Cicero's *De fato*, on the contrary, when discussing divination – a practice favoured by the Stoics as a logic of the interconnection of events – naturally advances a syllogism of the event (*De fato* 12): 'If someone is born while Sirius is rising, he will not die at sea' (Cicero 1968: 511).[10] Deleuze of course subsumes form under the event; we might translate 'what is effectuated' into 'form', and 'what is not effectuated' into 'what is not form in the event' (this is of course a restrictive use of the term 'form'; we could say 'actual form', in reference to Deleuze's distinction between actual and virtual). But the notion of singularity serves precisely to unite those two: the pure, should we say eventness or *événementualité* of singular repetition as difference-in-itself on the one hand, and the form of the effectuated on the other. This is why Deleuze's notion of 'singularity', considered as a technical term, unites traits from Gilbert Simondon's explicitly anti-Aristotelian conception of the singularness of the *event of individuation*

or of *individuation as an event* – individuation being understood as an act of information, that is, as the taking-shape or taking-form of an individual – with traits from mathematical concepts of singularity, notably Albert Lautman's interpretations of work by Henri Poincaré. On the side of the event, Simondon's singularity is an event of information, whereas on the side of form, the mathematicians' singularity informs a curve, being itself a point from which any arbitrarily close neighbouring point differs qualitatively – meaning that the curve will alter its course in the vicinity of such a singularity: if it went upward before reaching the singular point (a turning-point), after having reached it, the curve may go downward.

Simondon's major point of departure is that the 'hylemorphic scheme' is insufficient as an explanation of the existence of real individuals. His central contention – reiterated by Deleuze[11] – is that the coming-about of any entity equals the appearance of a metastable 'phase of being', which constitutes its own, new 'magnitude' (*ordre de grandeur*). A given portion of matter cannot enter into such a new individuation until it is in a suitable energetic state; so its constituent individualities, of a given magnitude, must be excited into a state of 'internal resonance' for a new individuality of relatively higher magnitude, held together by potential energy, to appear. This process of connecting given individualities into a new individuality of a higher magnitude, Simondon labels 'transduction'. Transduction in the Simondonian sense happens when the material that will come to constitute a future individual alters its state so that changes within that material no longer happen distributively, but collectively. An illustrative example from Simondon is that of nuclear fission: the chronologies of individual fissile nuclei stay independent of each other until a critical mass is accumulated; when the probability for the fission of a nucleus to provoke the fission of another reaches one (1), the nuclei have reached a state of internal resonance; from here on, the chronology and the topology of the whole become co-extensive, 'there is individuation, because there is an exchange between the microphysical and the macrophysical level' (Simondon 1996: 148).[12] Both resonance and transduction have to do with the 'pre-individual' – or phaseless – dimension of reality. It is because there is, in an individual, a pre-individual, conditioning, potentiality which has not been exhausted (its event has not been entirely effectuated, we could say with Deleuze), that this individual may enter into a new individuation, on a higher magnitude. So, any individual is essentially a relation, the relation of individuation, between the magnitude of the pre-individual field of resonance and the magnitude of the individual whose form results from

a, literally pre-individual, transduction. 'The individual, by its energetic conditions of existence, is not only inside of its own limits; it constitutes itself at the limit of itself and exists at the limit of itself; it comes out of a singularity' (Simondon 1996: 60). The notion of pre-individual[13] singularity here denotes less the spatio-temporal point where something that is neither the future individual nor its morphology – for instance, the walls of a mould or the germ of a crystal – meets the portion of matter that will enter into individuation, than the fact that such a meeting actually takes place, under energetic conditions that will actually lead to individuation. It includes the event of two orders of magnitude entering into communication. And so, it contains first, the notion that the morphology of the future individual can be traced back to its topological limits, and second, the notion that these may again be traced back to a set of singular encounters whose morphology is not that of the individual-to-be – these encounters *Logique du sens* interprets as events, drawing directly upon Stoicism. Talking of crystallisation, Simondon states that its singularity may be 'contained in a crystalline germ' (Simondon 1996: 76). The germ is to the crystal what the mould is to the brick, points of departure for the topological in-formation of new individuals. The former can only be considered pre-individual in relation to the latter. But it is clearly the pre-individuality of the encounter whose possibility is 'contained' here, as singularity. So, in *Logique du sens*'s reiteration of Simondon's economy of individuation, the singularity of the encounter 'subsists' (Deleuze) 'contained' (Simondon) as the intensity of becoming at the metaphysical surface that limits and in-forms a portion of individualised matter, whose form it shapes through so many qualitative (specific) traits (this surface corresponds to a set of points that are singular with respect to neighbouring points of the body on the one hand and of its surroundings on the other). In this sense, an individuality according to Deleuze retains its pre-individuality through its qualitative traits, that is: through its morphology. These traits express its intensive becoming, implying the entirety of the pre-individual transcendental field, both inside and outside (but those terms are not entirely meaningful here) of the individual's borders.

So, following Simondon, singularity is said of a form-giving event. And having stated the necessity of making the hypothesis of singularities, Deleuze goes on to speak of these as of 'emissions', which take place (the French expression is: *se font*, *se faire*) 'on an unconscious surface' (Deleuze 1973: 139) – this is in the fifteenth series, entitled 'of singularities'. He has just raised the question of the *survol*, or 'overflight', exemplified by the way in which a military battle '*overflies* its own

field' (Deleuze 1973: 137). This is precisely an example of 'meaning', according to Deleuze. So, meaning (as we move, whenever Deleuze is talking about '*survol*', within a Ruyerian conception[14]), as a field, is a field of 'emission' and of 'overflight', and it is in this field *en survol* that the emissions of singularities take place, while they are enjoying 'an immanent moveable principle of self-unification by *nomad distribution* [distribution nomade]' (Deleuze 1973: 139–40; Deleuze underlines). The 'immanent self-unification' is none other than the 'overflight' itself, and the 'distribution' of course is the 'emission'. Deleuze here equates the term '*émission*', which can only refer to an action or event (we are excluding television shows), with the term '*distribution*', which may refer to an action or event or to its result indiscriminately. This of course expresses the passage from event to form.

Transduction, we saw, was the co-extension of chronology, or the event, and topology, or the form. Overflight, now, is the co-extension of (un)consciousness and of its content, of (static) genesis and of the matter in-formed. Contrary to phenomenological sensation-of-shape, the Plotinian – and Bergsonian – leitmotiv of Ruyer's and so Deleuze's notion of the '*survol*' is none other than the coincidence of production and contemplation.[15] What Ruyer terms 'absolute domains of overflight', and, correspondingly, 'absolute surfaces',[16] are ideal morphologies – or structures – inasmuch as these hold together in all points without being held together by any localisable liaison. "'I"', Ruyer says of the field of consciousness, 'am in all places of my visual field at one and the same time. There is no propagation by contiguity [*de proche en proche*], no limit speed, for such a domain' (Ruyer 1952: 99). This point of view of contemplation Ruyer immediately inverts to the corresponding point of view of production: all consciousness, he states, is 'primary consciousness, the form in itself of any organism, and making but one with life' (104) This is life, holding together and forming, in-forming, what the authors of *Mille plateaux* would term the extensive 'strata' of the world, while being itself, in Ruyer's terms, 'non-localisable', or 'trans-spatial', and so in 'a sort of "metaphysical" transversal [*transversale*] to the [conscious] field as a whole' (105). So with the 'overflight', what is overflown is conceived as in its *heterogeneous multiplicity*, like in Bergson's 'pure memory' (Bergson 1997: 140, 142 and *passim*) or 'past in general' (148), where any two, what we cannot term 'points', pass immediately into each other, through each other, just like in Deleuze and Guattari's *rhizome*. The 'overflight' has the embedding and embedded, enveloping and enveloped, structure of the event. 'Every event extends itself over other events; and over

itself other events extend themselves' (Wahl 1932: 156), Jean Wahl says of Whitehead's conception of the event, which on this point is indistinguishable from those of Bergson, Ruyer or Deleuze. *Partes intra partes*.

What shares this structure (the word is used here in its broadest sense) is both Bergsonian duration and Deleuzian intensity. Both say the becoming of something, the becoming of an individuality, the becoming of its qualities, and say this becoming as the genetic reality – foundation or *effondement* – of what becomes. Deleuze's concept of intensity serves not least to clarify why there should not be too close an identification of heterogeneous duration with quality, since to Deleuze, quality, as something which is conceptually speaking identically repeatable, or actual, does not by itself entail difference-in-itself. In *Différence et répétition*'s chapter on the asymmetrical synthesis of the sensible, we meet instead intensity as the residual or expressed difference beneath extended magnitudes. It is here that we come upon Deleuze's triple definition of intensity. (1) Intensity is difference in itself, it 'comprises the unequal in itself' (Deleuze 1997: 299); it subsists as expressed virtual difference without actually ex-isting, even after this 'fundamental or original moment present in any quantity' (299) has been equalised, exteriorised in(to) an actual and expressing individuality. (2) Intensity 'makes out of difference an object of affirmation' (301); Deleuze here takes up J.-H. Rosny (aîné)'s conception of intensity as a difference composed of differences beyond any equality,[17] stating that intensity, as constructed in a difference between two series at least, affirms not only the superior series, but also the inferior one: in a difference E – E′, the series E′ *intrinsically* affirms itself *and* the series E; however, the series E cannot by itself affirm the series E′, since E′ is *extrinsic* to E, *from the viewpoint of E*; Deleuze finds the source of negation in this extrinsicity, saying that negation simply is difference viewed 'from below' (303). From this economy of differences implying differences, it follows that (3) intensity is 'an implied, enveloped, "embryonated" quantity' (305), E being itself a difference e – e′, and so on. It is this intrinsically enveloped character of intensity which allows it to subsist virtually, and so to stay pre-individual. But to let what is intensive stay pre-individual is to view it as a perpetual foundational act. Intensity, then, becomes characteristic of individuation. The couple intensity-individuation supplants Bergson's couple quality-duration, so that an intrinsically heterogeneous term, denoting difference-in-itself, supplants an intrinsically homogeneous term, denoting identity, and a term denoting an event supplants a term denoting a stretch of time.[18] Difference supplants metastability as

a conceptual framework. Unifying the terminology, we may say that the Deleuzian event perpetuates itself in the enduring overflight of a body's morphology as intensity. Again, the Aristotelian logic of form is subsumed under the Stoic logic of the event. What holds them together here is the enveloping-and-enveloped structure of Deleuzian intensity, whose place may be that of self-identical form or merely relational difference (the surface), but whose status is that of subsisting difference-in-itself or absolute difference.

Speaking of the body in terms of intensity, we tacitly assume that it is a singular body, and so we assume that it is not reducible to its recognisable specific traits. Pre-individuality is a prerequisite to singularity in Deleuze's thought, precisely because the actual individual is not *de iure* singular, but always a cluster of – conceptually speaking identically repeatable – specific traits. It is only by determining the individual through its pre-individual genesis that Deleuze attains its singular (and not only its specific, qualitative) difference. 'Singularity', in Deleuze, is never individual, it is the individual which, as the expression of its singularities, transcends its individuality (or rather withdraws into immanence from the transcendence of its individual extrinsicity).[19] On the other hand, the process of 'indi-drama-differen*t/c*iation' (317) amounts to the creation of 'species' and 'parts', that is: general and individual entities. This is where the ideality of Deleuze's surface is capable of corresponding to that of Husserlian species.[20]

That is indeed how morphology in general and structure in particular become susceptible of interpretation in Deleuzian terms.[21] The passage, or correspondence, again hinges on the notion of singularity. For in the 'species' and 'parts', 'differential relationships [*rapports différentiels*]' and 'singularities' actualise themselves, respectively, and inseparably, as 'the two traits of the Idea' (cf. Deleuze 1997: 281). The differential relationship might be between phonemes (*b/p*) or between subdivisions of the embryo (ectoderm/endoderm/mesoderm). The singularity, then, is at the onset of the subindividuation, or the differenciation, of the phonemes or of the embryonic subdivisions. This is singularity as event – or Deleuze's Idea as 'structure-event-sense' (Deleuze 1997: 247). Singularity as a mathematical notion intervenes when the singular event is converted into general form. It is to this end that Deleuze turns to differential calculus.

The notion which in *Différence et répétition* unites the conditions of intensity and singularness (to not use the term 'singularity', which Deleuze himself does not use when speaking of it) is the notion of difference that Deleuze notes *dx*.[22] The parallel issues of the individual

as *de iure* singular, of identity as difference, of morphology as structure[23] as well as of the event as an encounter of forces – all enter into the Ideal Synthesis of Difference (chapter IV of *Différence et répétition*). The Ideal Synthesis is meant to establish a passage from virtual differences-in-themselves to actual individualities. An actual individuality is determined both qualitatively and quantitatively: it has a complete determination. To Deleuze, establishing such a complete determination presupposes establishing a real determinability. And mathematically speaking, Deleuze now equals the complete determination of an actual individuality with the determination of the exact form of an integral curve (that is: of the actual values of x and y for a given function). And this real determinability of the curve-form as a whole, Deleuze conceptually brings about through the real determinability of the curve's single points (whether these are technically speaking singular points or not). These points, now, become determinable by virtue of the reciprocal determination of the differential magnitudes dx, dy: the differential relationship dx/dy determines a point on the integral curve. To Deleuze, this relationship dx/dy must be born out of the encounter of dx, and dy, as indeterminate differences-in-themselves. Russell's critiques notwithstanding,[24] it not only holds good for Deleuze's late eighteenth century/early nineteenth century *Wahlverwandtschaften* that, as Hermann Cohen puts it, '[*t*]*he identity of intensive and infinitely small magnitudes were a common assumption in Kant's day and age*' (Cohen 1968: 57–8 (§18); Cohen underlines), but also that 'the *infinitesimal number* is by no means simply a mathematical number concept, but it is *reality* that corresponds to it in the armature [*équipement/Gerüst*] of knowledge' (Cohen 2001: 605 [1918: 791]). This is why the form of differential calculus can be of universal, and not only mathematical, value to Deleuze.

In the '*collage*' (Deleuze 1997: 4) that is *Différence et répétition*, Deleuze famously convokes several lesser known philosophers of the infinitesimal: Jean-Baptiste Bordas-Demoulin, Salomon Maimon and Hoëne-Wronski, who are all brought to contribute to his conception of the dx. It is Bordas who stresses that we are not bound by the Newton/Leibniz alternative that deems dx either to be 0 or to have a definite value.[25] Instead, dx/dy indicates 'both the universal and the operation by which it has been found out [*dégagé*]' (Bordas-Demoulin 1843: II, 171). Bordas states that 0/0 in an equation $0/0 = y/a - x$ (corresponding to, but not being conceptually identical to dx/dy in the parallel equation $dx/dy = y/a - x$), 'indicates the exclusion of that which individualised the function'; what is left is 'what is permanent in the

function' (II, 170). So the function is deindividualised; what is left is what is universal to the function (its form, as reciprocal relationship). For 0/0 as a symbol of indetermination 'is indeterminate only apparently; since it is the trace of the passage from the consideration of the individual to the consideration of the universal, it implicitly represents the latter' (II, 170). Whereby we arrive at *dx* as the symbol of what is universal – once, and for all – in the generation of what is individual. And this something which is neither an individuality nor a zero, Deleuze seems to tacitly extrapolate, is a becoming. When it is not universal in the sense that it is once, and for all concerned, it is singular: once, and for one multiplicity. 'Below the universal there are plays of singularities, emissions of singularities', Deleuze states in *Foucault*, and the 'only case where the universal is said at the same time as the utterance appears, is in mathematics, because there, the "threshold of formalisation" coincides with the threshold of appearance' (Deleuze 1986: 96). But *dx*, as a symbol of intrinsic genesis, is not restricted to mathematics. In Maimon, Deleuze finds a more comprehensive account of *dx* – the differential – as a factor of ontogenesis: *dx* is neither an Idea of Reason (*Vernunftidee*), nor a Concept of Understanding (*Verstandesbegriff*), but an Idea of Understanding (*Verstandesidee*), pertaining to what are real objects that are simply not really constructible in sensible intuition.[26] The Idea, here, passes into the sensible without passing into measurable exactness; these ideal differentials are the noumena of phenomena, their conceptual role being to explain how phenomena come about [*entstehen*] (Maimon 2004: 23 [1790: 32]). 'The particular [*besonderes*] rule of the coming-about [*Entstehung*] of an object, or the species [*Art*] of its differential makes it a particular [*besonderes*] object' (2004: 24 [1790: 33]). So according to the *Versuch über die Tranzendentalphilosophie*, too, the differential yields formal specificity – just as the 'reciprocal determination' or the 'differential relationships' of *Différence et répétition* yield 'real determinability' and 'species'.[27] Finally, Wronski is summoned to supply a principle of complete determination, through the element of 'pure potentiality' (Deleuze 1997: 226). To Wronski, mathematics or 'Algorithmics' (*Algorithmie*) is essentially about 'THE GENERATION OF QUANTITIES FOLLOWING CERTAIN LAWS' (Wronski 1815: 2). Quantity as such is either 'real' and 'finite', and 'somehow the matter [*matière*] of Algorithmics' (2) – and is then produced by Understanding in a 'discontinuous summation'; or else quantity is 'indefinite' – and is then used by Reason to establish 'an ideal liaison in finite or real quantity', 'shaping' it or providing its 'form', in continuous 'INDEFINITE TRANSITION' (2). This, as René

Thom would say, *aporie fondatrice* (we recognise in passing the duality between 'parts' and 'species') is overcome by uniting discontinuous summation with indefinite transition, showing the latter to be generated through the former (quantity, obtainable by summation, was, after all, the 'matter' itself of 'algorithmic generation'). Now, this is the importance of series to Wronski: 'any function $F(x + i)$ necessarily implies GRADUATION'[28] whose influence upon the generation of quantities simply 'is what is called *function*'; and graduation 'constitutes nothing but indefinite transition or continuity in quantities' (6); yet, the function's Taylor series will present it as the sum of an infinite number of differential terms.[29] The idea – 'dx, that is the idea' (Deleuze 1997: 222) – stays regulatory, but generative. What is more, as any variable x may itself be taken as $F(y + i)$, any variable y as $F(z + i)$, and so on (Wronski 1815: 7ff.), the quantities involved can all be generated through sums of infinite series. So dx in Wronski can come to express for Deleuze the pure potentiality of generating actual, completely determined quantities, determinable through series enveloped in series, potentialities enveloped in potentialities. In this view, it becomes clear how dx can be the symbol of the possibility of unfolding something intensively enfolded, the point of articulation where the transcendental field is subject to its conversion into empirical objects.

Deleuze's account of the philosophy of the differential thus allows for pre-individual intensity (dx) to be converted into specificity (dx/dy) and individuality (x, y); and since intensity is by itself 'embryonated', we may assume that it 'subsists' (to use a Deleuzian phrasing) in the 'specific parts', *if* we assume with *Logique du sens* that this intensity *is* a surface, which is neither the portion of matter that is the individual part, nor its own specific form. So, speaking of individual form in terms of differential calculus *ipso facto* allows treating it in terms of an intensity whose own structure (this word again used in a broad sense) corresponds to that of the event: embryonation, overflight, rhizomatics. And this Deleuze does. And this is where singularities in a mathematical sense can be found.

III.

Through Albert Lautman, Deleuze repeatedly quotes Henri Poincaré's classification of the forms of curves defined by differential equations. In his four 1881–6 papers entitled *Mémoire sur les courbes définies par une équation différentielle* (Poincaré 1993), Poincaré shows how it is possible to globally determine curve-forms from their form in the vicinity of their

singular points. Parting from the cyclical or spiral-formed curves that are traceable on a sphere, Poincaré begins by listing four types of singular points: the saddle-point (*col*), where two, and only two cycles intersect; the focus (*foyer*), point of origin of a spiral curve, and which a point moving along that curve will approach indefinitely; the centre (*centre*), a point which is the summit of a topographical system;[30] and finally the knot (*nœud*), where an infinity of cycles intersect.[31]

References to precisely these four types of singular points are to be found in several instances. In the ninth series of *Logique du sens* – 'of the problematical' – the logico-paradoxical persons of Carroll's tales (the coincidence going for a walk with an accident) make Deleuze remind us that:

> psychological or moral persons, too, are made out of pre-personal singularities, and that their sentiments, their pathos, constitute themselves in the neighbourhood [*voisinage*] of these singularities, sensitive [*sensibles*] points of turning-back-crisis [*de crise de rebroussement*], of ebullition [or boiling points: *d'ébullition*], knots and foci (for example what Carroll calls *plain anger*,[32] or *right anger*[33]). (Deleuze 1973: 78)

Likewise, *Foucault*, labelling Foucault's *modus operandi* a '[s]erial method, based on singularities and curves' (Deleuze 1986: 29), draws upon Poincaré's classification, and so tacitly inscribes Foucault's analyses within the framework of *Différence et répétition*, when stating that a Foucauldian diagram of forces not only comprises the singularities of power corresponding to its relationships (*rapports*), but also 'singularities of resistance, such "points, knots, foci" which in turn effectuate themselves on the strata, but in such a way as to make change possible' (95). Deleuze indeed concludes that the (Foucauldian) utterance [*énoncé*] '*is the curve that unites the singular points*' (85), whereas the singular points themselves are the 'outside [*dehors*] of the utterance' (85). That *resistance is first* then comes to signify that actual relations of power are completely a matter of already traced curves, while new singularities may always arrive in emissions on the non-given 'outside', affecting the global shape of the curve from their local positions, or indeed making traceable a new curve, passing through other neighbourhoods, and having a qualitatively new configuration.

The fifteenth series – 'of singularities' – also quotes these four types: 'we know the existence and distribution [the French word here is not *distribution*, but *répartition*] of the singular points before we know their nature (saddle-points, knots, foci, centres ...)' (Deleuze 1973: 142), citing Lautman's posthumous *Le problème du temps* (Lautman 1946)

in a footnote. Lautman precisely lists the four types from Poincaré's *Mémoire*, and then goes on to comment:

> The existence and distribution [*répartition*] of singularities are notions that are relative to the vector field defined by the differential equation; the form of the integral curves is relative to the solution of this equation. The two problems [the distribution-*répartition* of singularities, the form of the curve] are surely complementary, since the nature of the singularities of the field is defined by the form of the curve in their neighbourhood [*voisinage*]; it is nevertheless true that the vector field on the one hand, the integral curves on the other hand are two essentially distinct mathematical realities. (Lautman 1946: 42, qtd in Deleuze 1973: 142, n.4)

This difference – in Lautman, the difference between Ideas that are problems, such as whole/part, continuous/discreet and essence/existence,[34] heirs to the Kantian antinomies, and 'notions relative to the concrete [*notions relatives au concret*]' (Lautman 1939: 8), such as actual mathematical concepts – is crucial to Deleuze. It contributes to founding the distinction between the virtual Idea, problematic and dialectic differentiation, and actual individualities, extrinsically prehensible in their phenomenology. Through the singularities' belonging to the *problematic* transcendental field – problematic not only in the sense of mathematical problems, but like with Lautman in the Kantian sense of *problematic judgements* as well – this field, together with the indetermination it carries along with it, can be given 'a fully objective definition' (Deleuze 1973: 142), precisely because the quality of the singularities (saddle-point, focus, centre, knot) can be made out to depend on one instance (the integral curves), and their existence and distribution-*répartition* on another (the vector field).

In *Différence et répétition*, the same Lautmano-Poincaréan example is connected to a parallel discussion of problematics. It is put forth right after Deleuze's saying that by speaking of "'the conditions of the problem", Carnot opened a road for metaphysics which spilled out over the limits of his theory' (Deleuze 1997: 229), and his saying that Leibniz had shown calculus to be *l'instrument d'une combinatorique*, expressing problems that could not have been posed before:

> No doubt the specification of singular points (for example saddle-points, knots, foci, centres) can only come about through the form of the integral curves which refer to the solutions of the differential equation. Nonetheless, there is a complete determination concerning the existence and distribution [*répartition*] of these points, which depends upon an entirely different instance, namely the vector field defined by the equation itself. (Deleuze 1997: 229–30)

This emphasis upon an autonomy of singularities which resides in their 'existence and distribution' (or to put it otherwise: in their *distribution*, as action and result) leads forward to Deleuze's asymmetrical distinction between (virtual) determining problems and (actual) determined solutions, as well as to the affirmation that '[*p*]*roblems are always dialectic*' (Deleuze 1997: 232). Problems, or Ideas, in a metaphysics of combinations of singularities (Leibniz), beyond or rather upstream from (*en aval de*) mechanistic, deterministic, interaction (Carnot).

Indeed, two other central aspects of Lautman's thinking, which are contained in Deleuze's use of differential calculus as a universal[35] philosophical model, are the notions that finality in mathematics may be a universal model for (self-)organisation, and that mathematical coming-into-existence of concrete notions out of dialectic Ideas may be viewed as a universal model for concrete coming-into-existence out of dialectic Ideas.

Lautman states that 'the organising action of a structure upon its elements', or 'the solidarity of [a] whole' – exactly the problems that Kant had to leave outside of the realm of determining judgements in the third *Critique*, we may add – become intelligible in mathematics, without any 'naïve anthropomorphism' or 'mysterious obscurity' (Lautman 1938: 29). The question of structure in biology and sociology – to Lautman, I think, these must include any symbolic structure, and so coincide with Ruyer's 'absolute domains of meaning' – now becomes thinkable on the mode of mathematics. Concerning this 'global' structuring of 'local' elements, Lautman later on emphasises precisely the example of Poincaré's study of the global characteristics of a(n analytical) function through its singular points (135–9).[36] The mathematical model may direct the action of thought in other areas as well, not because of any concrete applicability as a quantitative model, and not only because of its possible applicability by analogy as a qualitative model (although, since we are dealing with the foundation and coming-into-existence of qualities, this may not be unimportant), but as a genetic model, converting a virtual Idea which cannot enter into existence as is (since it is in itself dialectical, and so transcends any field of compossibility, to speak in Leibnizian terms), into actually existent notions – or, in other fields, individualities. And Lautman concludes his brief discussion of the similarities between his own dialectic genesis and Heidegger's ontological difference: 'Thus mathematics play, vis-à-vis the other domains of embodiment [*incarnation*], physical reality, social reality, human reality, the role of

models where to observe [*où observer*] how things come into existence' (Lautman 1939: 12).[37]

In Deleuze, the emission of singularities thus corresponds to the constitution of a vector field of a given form: a (re)distribution of forces that brings about new real possibilities of form. Considered as an empirical vector field, all points will, however, be quantitatively and qualitatively determinable (this is the case for Lautman's discussion of the duality field/curve). But the strength of Lautman's general interpretation of mathematics, from Deleuze's viewpoint, is that it allows for a problematic genetic ideality to subsist in the concrete mathematical notions that can be asserted. Combined with Bordas's notion that there is a residue from the grounding of form, outside of clear and distinct form itself, and of which the *dx* of calculus is a sign, intensity in Deleuze comes to be noted *dx* and is identified at one and the same time with the real determinability (Maimon) of Lautman's vector points, and with the problematic status of his genetic ideas. So, Deleuze connects the event to form or morphology, thinking its unfolding from transcendental genesis (distribution of singularities) to morphogenesis. The term 'heterogeneous multiplicity' should now apply to both *dx*, as intensity, to the event, as connection of intensities, and to form (structure), as overflight.

IV.

We seem, however, only to know the decidedly pre-individual singular intensities that are noted *dx* through the remarkable or singular, yet individual, points as Poincaré or Thom classify them, and which can but express the singularity-as-event that is the encounter of a multiplicity of forces, *dx*, *dy*, *dz*, ...[38] If we do not accept points as individualities, the notion that complete determination equals knowledge of the exact values of *x* and *y* would fall away. But to know, what is that? To sense, we could say. Deleuze and Guattari develop the connection between force, contraction and contemplation towards the end of *Qu'est-ce que la philosophie?*:

> So we search in vain for sensation so long as we stay with reactions and the excitements they provoke: this is because the soul (or rather the force), as Leibniz said, does nothing or does not act, but is only present, it preserves [*conserve*]; contraction is not an action, but a pure passion which preserves [*conserve*] the preceding one in the following one. Sensation is thus on another plane than mechanisms, dynamisms, and finalities: it is a plane of composition where sensation forms itself in contracting what composes

> it, and composing itself with other sensations which it contracts in turn. Sensation is pure contemplation, for it is by contemplation that one contracts, contemplating oneself as [*à mesure que*] one contemplates the elements from which one proceeds. (Deleuze and Guattari 1991: 199–200)

The soul, or force. And force contracts, force senses, force senses forces in contracting them. This we are able to think, but not directly to perceive. Sensation is equalised in perception. Contemplation vanishes in its object.

If we turn to the treatment of the question of singularities in the book on Leibniz, we find four types of singularities: (1) as inflexions, maxima or minima of a curve, 'the point of inflexion which prolongs itself to the neighbourhood of other singularities'; (2) as centres, 'the curvature's centre on the concave side as it defines the viewpoints of the monad following relations of perspective'; (3) as what is 'remarkable, following differential relationships which constitute perception in the monad';[39] and (4) as '*singularities of extremum*' which no longer constitute a 'reciprocal determination by differential relationships, but a complete determination of the [material] object by maximum or minimum'.[40]

Now, the individual object (4) must be the name of the singularities corresponding to the surface of an individuality as they in-form it in individual ontogenesis. The perception in the monad (3) must be the name of the relations of singularities corresponding to specific form. The centres (2) must be the name of the singularness of an absolute domain or field of overflight as such – as the trans-spatial complement of a set of singularities (4) which give the spatio-temporal coordinates of its individual portion of matter. The trouble is what the absolute domain – our consciousness – is perceiving. 'We must understand literally, that is to say mathematically, that conscious perception produces itself when at least two heterogeneous parts enter into a differential relationship that determines a singularity' (Deleuze 1988: 117). So the absolute domain is perception of specificity; and as perception of specificity, it is also perception of an individual object. Yet we never go beyond specific individual traits and their just as specific configurations here. So, as the domain of a contraction, as (the result of) an encounter of forces, the absolute domain, even though it contemplates the forces written *dx* in *Différence et répétition*, only perceives their expression in singularities, which must significantly be described themselves in terms of already-individuated points capable of bearing specificity. As points that can be noted x (or x, y, z ...), the singular points of a curve, or the singular points constituting the

surface of an individuality, are not such singular intensities (dx), but correspond to specificating encounters (dx/dy). The singular points of an individuality's surface stay intensive in the role of informing it, while they remain equalised in the role of specifying it.

It is true that the intensive differentials (dx, dy) can be viewed in Deleuze as the multiple sensations underlying any specific perception (dx/dy). But it remains a mystery exactly how these intensities may be contemplated through any specificity (dx/dy), let alone by an individual (x). Indeed, one ought to assume that a pre-individual intensity (dx) as a sensing force would perceive a specificity (dx/dy) and contemplate itself! If we look at any specific individual (x), its Ruyerian *forme vraie* would of course be a contemplating intensity. But this we can say from the viewpoint of enduring individuality (which in the Ideal Synthesis would be noted x), without having recourse to either specificity (Ideal Synthesis: dx/dy) or intensity as force (Ideal Synthesis: dx)! The crux of this question is that we have to assume that the intensity of dx simply passes into the specificity of dx/dy and into the individuality of x. Only the aim of Deleuze's differential scaffolding is to explain the disappearance of intensity when equalised in actual specific individuality – as well as to explain the subsistence of intensity beneath equalisation, but then precisely in the form of dx! Although the notion of singularity allows for the passage from event to form, it is still the concept of intensity that would allow for the difference $\mathrm{E}-\mathrm{E}'$ corresponding to an individual (x) to contemplate pre-individual difference $\mathrm{e}-\mathrm{e}'$ (dx). But in the economy of Deleuzian intensity, there is no individual $=x$. The two scaffoldings do not coincide.

Perhaps the books on cinema are not least working on a solution as to how pre-individual forces may become sensible to the individual consciousness. As dx, these could be shown to underlie individuality, but as its unconscious, while as the 'absolute domain' of an individual, intensity could not be conceptualised through the same pre-individual notion dx (the individual's intensity would rather be some kind of $d[x]$ or $d[x, y, z \ldots]$). Art, then, comes to take on a foundational role, as it is called upon to provide the sensation of pre-individuality. We do not see, in movies. We see the camera seeing. In doing so, we break free from the interactive constraints of evolutionarily adapted perception. When art mounts a plane of composition, it lets us sense sensing.[41] We may perhaps sense ourselves as multiple sensation if we exteriorise ourselves in work.[42] This would let the regulatory problematic idea of pre-individual forces, and of the evenemential singularities that relate them, become sensible (art as the becoming-sensible of the idea). Hence

the strategic importance of the repeated remarks that '*we need reasons for believing in this world*' (Deleuze 1985: 223), that 'we need to believe in this world' (225). To believe in this world is to believe that the phenomenal forms we perceive really express events capable of concerning us.[43] The leap of faith takes us from the individual point on the integral curve to the pre-individual singularity it expresses, and from intensity as pre-individual force to the contemplative self-enjoyment of the singular individual in its absolute domain. It would allow us to exclaim: 'All is regular! and All is singular!' (Deleuze 1988: 81).

Notes

1. Where nothing else is mentioned, all translations are mine.
2. Cf. 'Singularities are *ideal events*' (Deleuze 2002b: 13).
3. If the particular and the general do not simply fuse into one transcendental illusion of identical plurality, then specificity – which is presented in *Différence et répétition* as the heir to generality (Deleuze 1997: 318) – would denote a singular event concerning more than one individuation, while part/icularity would denote the singular event concerning some individual part of an individual(ity) – see the remarks on 'differentiation' giving birth to 'qualities or species' and 'number and parts' (Deleuze 1997: 271).
4. See Husserl 1992b: §§89–91, notably.
5. See Deleuze 1973: 24, and the remarks on Descartes.
6. Sartre follows Husserl's (phenomenological) belief in a 'constituting consciousness' (Sartre 1965: 18). However, he sees no need for an 'I' [*moi*] beyond the psychical and psycho-physical one that falls under the *épochè* as an object, transcendent from consciousness itself. Placing a transcendental 'I' [*Je*] in consciousness would only serve to install an opaque point of non-consciousness within consciousness and so compromise its phenomenologically translucid character (see Sartre 1965: 23–6). So, the content of the pseudo-Cogito, as Sartre puts it, must be '*there is* consciousness of this chair' rather than '*I have* consciousness of this chair' (37). The consequence is that the transcendental field (of consciousness) becomes 'impersonal' or 'prepersonal', making thinkable an 'absolutely impersonal consciousness' (15).
7. Cf. Deleuze's critique of (phenomenological) extrinsicity, for instance regarding repetition (Deleuze 1997: 349–50). He also cites with approval (233) Jules Vuillemin's appraisal of the mathematician Abel; Abel's 'general method' parts from the most general relation or set of relations capable of determining a property, then to consider the class of beings to which this property is to be attributed, and finally – 'analys[ing] these beings from a general viewpoint, [. . .] defin[ing] the relations to which their nature permit them to be subjected' (Vuillemin 1993: 214) – to reveal incompatibilities and indicate the road towards the discovery of new relations. Vuillemin translates Abel's very Leibnizian demand for an intrinsic determination of possibility in the concept, searching from there for its applicability, into the language of the *Critique of Pure Reason*: the limits of Reason's 'palace, rational Metaphysics' (220) ought not to be posed from the outside, from 'a faculty exterior to reason, [that is:] sensible intuition' (220); on the contrary, it is, for instance, from 'inside the concept of infinity [*l'infini*] that it might perhaps be suitable to search for the reason

why it is impossible to speculatively prove the existence of God' (220). These considerations Deleuze builds into his architecture of the Idea: the articulation of a problem whose further differenciations end up by generating *real possibilities* or *real potentialities* (as Peirce or Whitehead would say) which actualise as empirical individualities.

8. Cf. the twenty-first series of *Logique du sens*, 'of the event': 'on the one hand, the part of the event that realises itself and fulfils itself [*se réalise et s'accomplit*]; on the other hand, "the part of the event that its fulfilment cannot realise"' (Deleuze 1973: 207).
9. Aristotle 2007: 21–2 (*Prior Analytics* 25a).
10. Signalled by Diano 1994: 14–15.
11. Deleuze published a review of Simondon's 1964 thesis *L'individu et sa genèse physico-biologique* (Simondon 1996) in 1966 (Deleuze 2002a). *Différence et répétition*'s concept of 'indi-drama-different/ciation' takes Simondon as an important point of departure. A footnote in the fifteenth series of *Logique du sens* states: 'All of Simondon's book seems of great importance, because it presents the first rationalised theory of the impersonal and pre-individual singularities. It explicitly proposes itself to make a genesis of the living individual and of the knowing subject from these singularities. Therefore it is a new conception of the transcendental. And the five characteristics by which we try to define the transcendental field: *potential energy of the field, internal resonance of the series, topological surface of the membranes, organisation of sense, status of the problematic*, are all analysed by Simondon. So much [*Si bien*] that the content of this paragraph and of the following one ["of the ontological static genesis"] depend closely upon this book, from which we only separate ourselves by our [*les*] conclusions' (Deleuze 1973: 141, n.3).
12. In the case of a brick, the transduction happens when the heat from burning and the pressure from the mould cause the clay molecules to simultaneously take on a collective individuality, held together by potential energy. If the internal resonance is incomplete, the brick will crack in the burning process. To Simondon and to Deleuze, living organisms are individualities that simply do not cease the individuating process: theirs is a state of permanent transduction.
13. 'Pre-individual' recurs throughout Simondon 1996.
14. See for instance the crucial references to Raymond Ruyer on the question of overflight in *Qu'est-ce que la philosophie?* (Deleuze and Guattari 1991: 26 n., 198, 201). See also *Le pli* (Deleuze 1988: 137ff.).
15. Cf. also the conclusion of *Qu'est-ce que la philosophie?*: 'To contemplate is to create, the mystery of passive creation, sensation' (Deleuze and Guattari 1991: 200), with its explicit reference to the third *Ennead*. Cf. also Deleuze 1997: 102: 'Everything is contemplation!'
16. For both notions see Ruyer 1952: ch. IXff.
17. Rosny writes: 'Since intensity already expresses a difference, it would be necessary to better define what should be understood [*entendre*] by that, and in particular to let it be understood [*comprendre*] that intensity cannot be composed out of two homogeneous terms, but at least out of two series of heterogeneous terms. Thus a difference of temperature or of potential would not be comparable to a difference between two uniform levels, but to the difference between two irregular levels, like for example the irregular summit of a mountain and its no less irregular base' (Rosny 1930: 67). Cf. also his statement that 'probably, any (calculable) energy implies factors of the form $E-E'$, in which E and E' themselves hide factors of the form $e-e'$, and this indefinitely, for we shall never attain an energetic quantity E that supposes no difference' (6). Cf. also Deleuze 2002b: 135.

18. Duration in itself is to be heterogeneous in Bergson. As duration (and not generation) of specific qualities, however, it does appear in the form of measurable chronology (the colour of magenta existing in a *hic et nunc* that stretches from T1 to T2), rather than a *devenir*. Deleuze here strives to avoid any concepts that could also apply to the actually generated and to the extensive (as opposed to the virtually generative and to the intensive).
19. Cf. the remark that '[t]his is the real definition of the individual: *concentration, accumulation, coincidence of a certain number of convergent pre-individual singularities*' (Deleuze 1988: 84–5); trans-spatial coincidence of the parts in a '*forme vraie*'.
20. Cf. the well-known rhetorical question asked in the third series – 'of the proposition' – of *Logique du sens*: whether phenomenology would be 'that rigorous science of surface-effects' (Deleuze 1973: 32). Husserl's '*eidetic singularities*' (Husserl 1992a: 30; Husserl underlines), as *species infima*, are still specific differences, and so to Deleuze belong to the realm of effects, and not to that of events.
21. Cf. the way in which 'À quoi reconnaît-on le structuralisme?' (Deleuze 2002c) is parallel to *Différence et répétition* and to *Logique du sens*.
22. 'We oppose *dx* to non-A, as the symbol of difference (*Differenzphilosophie*) to that of contradiction – as difference in itself to negativity' (Deleuze 1997: 221). Cf. already the use of *dx* to conceptualise the will to power in *Nietzsche et la philosophie* (Deleuze 1999: 57–8), including an indirect reference to Salomon Maimon through Guéroult 1929.
23. 'Structure is the reality of the virtual' (Deleuze 1997: 270); 'structure is independent of a principle of identity' (238).
24. Russell is wholly dismissive of Cohen's interpretation of the infinitesimal, as he is of the term 'infinitesimal' and of the notation *dx/dy* altogether (cf. Russell 2010: chs 39–41 (§§303–24); specifically for Cohen, cf. Russell 2010: 344ff. (§§317ff.)). Deleuze's remarks that '[y]ou need lots of truly philosophical naïveté, and lots of drive' and '[m]any philosophical riches, here, must not be sacrificed to modern scientific technique' (Deleuze 1997: 221) (on Bordas, Maimon and Wronski), together with his treatment of the modern interpretation of the differential in terms of a limit as a matter of course (cf. Deleuze 1997: 223, 228–9), all tacitly serve to defuse Russell's objections to the infinitesimal's having any relevance. Russell rejects both 'the identification of the intensive magnitude with the extensive infinitesimal' (Russell 2010: 331 (§303)) and the notion that 'true infinitesimals [are] presupposed in limits' (278 (§262)). Deleuze does not disagree, but repudiates, with Bordas, Russell's alternative – that *dx* and *dy* be either zero, finite or mathematical fictions (cf. Russell 2010: 330 (§303)) – as he does by suggesting that 'the other alternative, that of finite or infinite representation' (Deleuze 1997: 231) might also be dropped (*tomber*). Becoming, in Deleuze, is to be neither finite nor infinite. And so a rigorous exposition of differential philosophy in general must 'not depend on the infinitely small' (Deleuze 1997: 221).
25. 'If like Newton you oblige yourself to annihilate the differentials, there is nothing left to consider; if, with Leibniz, you attribute to them a value, you ruin the exactitude of calculus' (Bordas-Demoulin 1843: II, 163–4).
26. Cf. on the example of asymptotes, Maimon 2004: 48, 202 [Maimon 1790: 79, 373].
27. Incidentally, it is Maimon who provides the armature 'indeterminate-reciprocal determination-complete determination'. As is well known, Maimon combines Kant's search for transcendental conditions with Hume's rejection of synthetic a priori judgements. Plato's and Kant's $7 + 5 = 12$ is only synthetic to

the finite understanding; to an infinite one, Maimon says, it is *analytic*. Complete determination now takes place – for the infinite understanding – 'in relation [*Beziehung*] to all possible relationships [*Verhältnisse*]' (Maimon 2004: 52 [1790: 86]), relationships or *Verhältnisse* which in the French tradition are rendered as reciprocal, cf. Martial Guéroult's comment on the above quote: 'Reciprocal determination creates the singularity of things in infinite understanding' (Guéroult 1929: 77). As Maimon says, 'understanding brings out from the relationships [*Verhältnisse*] between these different differentials, which are its objects, the relationship between the sensible objects that have their source in them [*aus ihnen entspringenden*]' (Maimon 2004: 23 [1790: 32]); the 'differential relationships' between the 'singularities' of *Différence et répétition* likewise bring about the specific differences between individual 'parts'. So, Maimon sums up, 'the differential of any object in itself is, with respect to intuition [*Anschauung*], $=0$, $dx=0$, $dy=0$ etc.; but their relations [*Verhältnisse*] are not $=0$, but can be determinedly [*bestimmt*] indicated in the intuitions that have their source in them [*den aus Ihnen entspringenden Anschauungen*]' (2004: 23 [1790: 32]). All in all, we get a genetics starting from intensive differentials dx or dy, entering into relations which bring forth an object which ends up completely determined in its individuality.

28. Wronski's notion of '*primitive elementary algorithms*' (Wronski 2010: 7) connects the elevation to powers, the extraction of roots, and the four basic arithmetical operations (addition, subtraction, multiplication, division) to the Kantian faculties of Reason, Understanding and Judgement. Addition and subtraction are united into the algorithm 'summation' (*sommation*), which is 'founded on the *constitutive laws of understanding strictly speaking*' (6). Powers and roots are united into the algorithm 'graduation' (*graduation*), which is 'founded on the *regulatory laws of reason*' (6). Finally, multiplication and division, reunited into the algorithm 'reproduction' (*réproduction*), correspond to '[t]he neutralisation of these two intellectual functions' (6), and stand in an essential relationship to 'the faculty of *judgement*' (7), as an intermediary between Understanding and Reason.
29. Indefinite infinitesimals play a direct generative role in Wronski, operating a passage from the realm of Reason to that of Understanding: 'In effect, the finite quantities and the indefinite quantities, that is to say, the infinitesimal quantities, belong to two classes of knowledge [*classes de connaissances*], altogether different and even heterogeneous: the finite quantities bear upon the objects of our knowledge [*les objets de nos connaissances*], and the infinitesimal quantities bear upon the generation itself of our knowledge [*de nos connaissances*]: so that each of those two classes of knowledge [*classes de connaissances*] must have its own laws' (Wronski 1814: 35). To Wronski, finitude (*le fini*) and infinity (*l'infini*), as 'two altogether heterogeneous functions of our knowledge [*savoir*]' (4), are products of Understanding and Reason, respectively. This means that the infinite is outside of time (as form of intuition), and so lies outside of the realm of experience. To Wronski, it can only act as a regulatory idea, and to do this must be subjected to 'the conditions of time, through the influence of JUDGEMENT' (34). This transforms the idea of infinity into the idea of indefiniteness (*l'indéfini*), introducing 'ultimate unity or ultimate signification, not into the object of knowledge [*savoir*], into being, but precisely [*bien*] into the functions of knowledge [*savoir*] themselves, relative to knowledge [*connaissance*] of quantity' (34).
30. 'If we trace on the sphere a system of cycles and polycycles [cycles presenting double points] so that through each of the points of the sphere there passes one cycle or one polycycle, and only one, except for some singular points through

which no cycle passes, we shall say that this system of cycles is a *topographical system*, because it is analogous to the system of level-curves of a terrain. The double points of the polycycles are then analogous to saddle-points of this terrain, the singular points through which no cycle passes are analogous to the *bottoms* and to the *summits* of the terrain' (Poincaré 1993: 383 (ch. I)) To put it briefly, they are 'mutually enveloping closed cycles enveloping the centre' (Lautman 1946: 42).

31. See Poincaré 1993: chs I–IV.
32. In English in the text.
33. In English in the text.
34. See Lautman 1938: 149–50. Elsewhere, Lautman remarks that 'the Ideas of dialectical relations are affirmative of no liaison that in fact exists between notions whatsoever. As "posed questions" they constitute but a problematics, relative to eventual situations of the existing' (Lautman 1939: 14).
35. What is not universal are the different 'ordinal ideas' (regional ontologies, Husserl would say) which differentiate themselves differently; these ordinal ideas vary according to 'the nature of the elements and of the differential relationships: a mathematical, a mathematical-physical, a chemical, a biological, a psychical, a sociological, a linguistic Idea . . . ' (Deleuze 1997: 242).
36. In *Le problème du temps*, too, Lautman takes up the question of finality in mathematics (Lautman 1946: 45).
37. René Thom's Catastrophe Theory (CT) attempts to fulfil Lautman's programme. It is a classification of singularities, embedding unstable curves in families of stable curves. This leaves sets of degenerate critical points (points whose neighbouring points are themselves critical), 'catastrophe sets', which form interfaces between surrounding subsets in the spaces concerned. Each subset is stable, because its curves share the same configuration of ordinary critical points (maxima or minima): any arbitrarily small quantitative alteration will entail no qualitative change. It is only in the vicinity of the catastrophe set that qualitative change takes place, because there, any arbitrarily small quantitative alteration will entail change. So CT conceptualises structural stability through the possibility of passage between mutually different metastable qualities. Since the morphology of a catastrophe set is unaltered, no matter how many further variables are added to the equations, the 'catastrophes' may serve as universal morphological stabilisations (cf. Thom 1975). As differential theories of structure as topology, Thom's and Deleuze's mutually independent work bears close resemblances, as Jean Petitot has stressed (Petitot-Cocorda 1985). In a rare instance of his actually using the word 'morphology', Deleuze hails Thom for giving the 'elementary events' (the so-called elementary catastrophes) in a 'morphology of the living' (Deleuze 1988: 22).
38. One way to interpret *dx* is as a force; *dx/dy* is then an encounter of forces. Mathematically speaking, a *dx* taken for itself would be nonsense: its *ratio essendi* and its *ratio cognoscendi* are the same, namely the relationship *dy/dx*. However, what Deleuze says of Nietzsche fuses the two as well: 'every force is [. . .] in an essential relationship with another force' (Deleuze 1999: 7). And again, '[p]ower [*puissance*] (what Nietzsche calls "will to power" and Welles "character") is this power [or capacity, the French word is *pouvoir*] to affect and to be affected, this relationship [*rapport*] of one force with another' (Deleuze 1985: 182). Witness again the use of *dx* to conceptualise the will to power in Deleuze 1999: 57–8.
39. (1), (2) and (3), see Deleuze 1988: 121.
40. (4) see Deleuze 1988: 135.

41. For the logic of cinematographic perception, see Deleuze 1983; for art as a plane of composition, see Deleuze and Guattari 1991.
42. In a vein that is not Deleuzian, Georges Poulet's admirable essay, 'Bergson, la vision panoramique des mourants, la juxtaposition' (Poulet 1982: 165–205), discusses whether there can be talk of any kind of intellectual attention in the case where, according to Bergson, renouncing one's interest in the evolutionarily adapted pragmatics of life leads to the panoramic view of one's entire life-span, when death approaches. Poulet precisely discusses this question, which is analogous to ours, in connection with what we might call the becoming-sensible of the singularities that determine an individual life (reprinted in *L'espace proustien* (Poulet 1982), the essay is of course intended to shed light on the process of rememoration in Proust).
43. Cf. the lament that 'we do not even believe in the events that happen to us, love, death, as if they only halfway concerned us' (Deleuze 1985: 223). Deleuze states: 'Only belief in the world can connect [*relier*] man to what he sees and hears' (Deleuze 1985: 223).

References

Aristotle [this translation 1936] (2007) *Aristotle: Premiers analytiques (Organon III)*, trans. Jules Tricot, Paris: Vrin (*Bibliothèque des textes philosophiques*).

Bergson, Henri [1896] (1997) *Matière et mémoire*, Paris: Presses universitaires de France (*Quadrige*).

Bordas-Demoulin, Jean-Baptiste (1843) *Le cartésianisme ou la véritable rénovation des sciences I–II*, Paris: J. Hetzel.

Cicero (1968) 'De fato/Sul destino', ed. Francesco Pini, in Marco Tullio Cicerone, *I paradossi degli stoici, Il Timeo, Della divinazione, Sul destino (Tutte le opere, XXVI)*, Milan: Mondadori.

Cohen, Hermann [1883] (1968) *Das Prinzip der Infinitesimal-Methode und seine Geschichte*, Frankfurt/Main: Suhrkamp (*Theorie 1*).

Cohen, Hermann [1918/1885/1871] (2001) *La théorie kantienne de l'expérience*, trans. Éric Dufour and Julien Servois from the 1918 3rd edn of *Kants Theorie der Erfahrung* (Berlin: Cassirer), Paris: Cerf (*Passages*).

Deleuze, Gilles [1969] (1973) *Logique du sens*, Paris: Union Générale d'Éditions (*10/18*).

Deleuze, Gilles (1983) *L'image-mouvement*, Paris: Minuit (*Critique*).

Deleuze, Gilles (1985) *L'image-temps*, Paris: Minuit (*Critique*).

Deleuze, Gilles (1986) *Foucault*, Paris: Minuit (*Critique*).

Deleuze, Gilles (1988) *Le pli – Leibniz et le baroque*, Paris: Minuit (*Critique*).

Deleuze, Gilles [1968] (1997) *Différence et répétition*, Paris: Presses universitaires de France (*Épiméthée*).

Deleuze, Gilles [1962] (1999) *Nietzsche et la philosophie*, Paris: Presses universitaires de France (*Quadrige*).

Deleuze, Gilles [1966] (2002a) 'Gilbert Simondon, *L'individu et sa genèse physico-biologique*', in *L'île déserte et autres textes. Textes et entretiens 1953–1974*, Paris: Minuit (*Paradoxe*), pp. 120–4.

Deleuze, Gilles [1967] (2002b) 'La méthode de dramatisation', in *L'île déserte et autres textes. Textes et entretiens 1953–1974*, Paris: Minuit (*Paradoxe*), pp. 131–62.

Deleuze, Gilles [1972 (1967)] (2002c) 'À quoi reconnaît-on le structuralisme?', in *L'île déserte et autres textes. Textes et entretiens 1953–1974*, Paris: Minuit (*Paradoxe*), pp. 238–69.
Deleuze, Gilles and Félix Guattari (1991) *Qu'est-ce que la philosophie?*, Paris: Minuit (*Critique*).
Diano, Carlo [1952] (1994) *Forme et événement – Principes pour une interprétation du monde grec*, trans. Paul Grenet and Michel Valensi from *Forma ed evento – Principi per un interpretazione del mondo greco* (Venice: Neri Pozza), Paris: Éditions de l'Éclat.
Guéroult, Martial (1929) *La philosophie transcendantale de Salomon Maïmon*, Paris: Félix Alcan (*Bibliothèque de philosophie contemporaine*).
Husserl, Edmund [1913] (1992a) *Ideen zu einer reinen Phänomenologie* (*Gesammelte Schriften 5*, ed. Elisabeth Ströker), Hamburg: Felix Meiner.
Husserl, Edmund [1929] (1992b) *Formale und Transzendentale Logik* (*Gesammelte Schriften 7*, ed. Elisabeth Ströker), Hamburg: Felix Meiner.
Lautman, Albert (1938) *Essai sur les notions de structure et d'existence en mathématiques I–II*, Paris: Hermann (*Actualités scientifiques et industrielles*).
Lautman, Albert (1939) *Nouvelles recherches sur la structure dialectique des mathématiques*, Paris: Hermann (*Actualités scientifiques et industrielles*).
Lautman, Albert (1946) *Symmétrie et dissymétrie en mathématiques et en physique. Le problème du temps*, Paris: Hermann (*Actualités scientifiques et industrielles*).
Maimon, Salomon [1790] (2004) *Versuch über die Transzendentalphilosophie*, Hamburg: Felix Meiner (*Philosophische Bibliothek*).
Petitot-Cocorda, Jean (1985) *Morphogenèse du sens*, Paris: Presses universitaires de France (*Formes sémiotiques*).
Poincaré, Henri [1881–6] (1993) *Mémoire sur les courbes définies par une équation différentielle*, Paris: Jacques Gabay.
Poulet, Georges [1963] (1982) *L'espace proustien*, Paris: Gallimard (*Tel*).
Rosny (aîné), J.-H. [1922] (1930) *Les sciences et le pluralisme. Nouvelle édition*, Paris: Félix Alcan (*Nouvelle bibliothèque scientifique*).
Russell, Bertrand [1940] (1966) *An Inquiry into Meaning and Truth*, London: Allen & Unwin.
Russell, Bertrand [1903] (2010) *Principles of Mathematics*, London and New York: Routledge (*Routledge Classics*).
Ruyer, Raymond (1952) *Néo-finalisme*, Paris: Presses universitaires de France (*Bibliothèque de philosophie contemporaine*).
Sartre, Jean-Paul [1936] (1965) *La transcendance de l'ego*, Paris: Vrin (*Bibliothèque des textes philosophiques*).
Simondon, Gilbert [1964] (1996) *L'individu et sa genèse physico-biologique*, enlarged 2nd edn, Grenoble: Jérôme Millon (*Krisis*).
Thom, René [1972] (1975) *Structural Stability and Morphogenesis*, trans. D. H. Fowler from *Stabilité structurelle et morphogenèse*, Reading, MA: Benjamin/Cummings.
Vuillemin, Jules [1961] (1993) *La philosophie de l'algèbre*, Paris: Presses universitaires de France (*Épiméthée*).
Wahl, Jean (1932) *Vers le concret*, Paris: Vrin (*Bibliothèque de l'histoire de la philosophie*).
Wronski, Hoëné (1814) *Philosophie de l'infini, contenant des contre-réflexions et des réflexions sur le calcul infinitésimal*, Paris: P. Didot.
Wronski, Hoëné (1815) *Philosophie de la technie algorithmique – Première section, contenant la loi suprême et universelle des mathématiques*, Paris: P. Didot.

[Wronski, Hoëné de] Hoëné-Wronski, Józef Maria [1811] (2010) *Introduction à la philosophie des mathématiques et technie de l'algorithmie*, Milton Keynes: Nabu Press (272 pp. print-on-demand facsimile of the 1811 1st edn, Paris: Courcier, small-character mathematical notations not always clearly readable, folded table after p. 270 only partially rendered).

Your short guide to the EUP Journals Blog http://euppublishingblog.com/

A forum for discussions relating to Edinburgh University Press Journals

1. The primary goal of the EUP Journals Blog

To aid discovery of authors, articles, research, multimedia and reviews published in Journals, and as a consequence contribute to increasing traffic, usage and citations of journal content.

2. Audience

Blog posts are written for an educated, popular and academic audience within EUP Journals' publishing fields.

3. Content criteria - your ideas for posts

We prioritize posts that will feature highly in search rankings, that are shareable and that will drive readers to your article on the EUP site.

4. Word count, style, and formatting

- Flexible length, however typical posts range 70-600 words.
- Related images and media files are encouraged.
- No heavy restrictions to the style or format of the post, but it should best reflect the content and topic discussed.

5. Linking policy

- Links to external blogs and websites that are related to the author, subject matter and to EUP publishing fields are encouraged, e.g.to related blog posts

6. Submit your post

Submit to ruth.allison@eup.ed.ac.uk

If you'd like to be a regular contributor, then we can set you up as an author so you can create, edit, publish, and delete your *own* posts, as well as upload files and images.

7. Republishing/repurposing

Posts may be re-used and re-purposed on other websites and blogs, but a minimum 2 week waiting period is suggested, and an acknowledgement and link to the original post on the EUP blog is requested.

8. Items to accompany post

- A short biography (ideally 25 words or less, but up to 40 words)
- A photo/headshot image of the author(s) if possible.
- Any relevant, thematic images or accompanying media (podcasts, video, graphics and photographs), provided copyright and permission to republish has been obtained.
- Files should be high resolution and a maximum of 1GB
- Permitted file types: *jpg, jpeg, png, gif, pdf, doc, ppt, odt, pptx, docx, pps, ppsx, xls, xlsx, key, mp3, m4a, wav, ogg, zip, ogv, mp4, m4v, mov, wmv, avi, mpg, 3gp, 3g2*.