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Ghosts in the Curriculum – Reframing Concepts as Multiplicities

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Abstract:

Contemporary curricula specify the conceptual understanding that will be important for pupils in the world that they will soon inhabit. In so doing, concepts are characterised as representing the essential qualities of phenomena, the knowledge of which will be applicable in future contexts. Yet such a characterisation divorces concepts from the here and now, and from the detail of the activities and problems presented to learners in classrooms. I argue that there is a category error inherent in the way that the spectres of conceptual understanding are assumed to emerge from the unique circumstances of educational practice. This error has a long heritage which spans from Aristotle's essentialism to cognitivist theories of learning. I will show that this category error is sustaining an unnecessary separation between knowledge and learning in contemporary debates about curriculum, pedagogy and assessment. Deleuze's notion of *multiplicity* offers an alternative characterisation, making a single curricular concept synonymous with the many, unique manifestations of that concept in the world. Seeing concepts as multiplicities allows us to recognise that curricular concepts themselves, and the conceptual understandings of individuals, are in a process of continual becoming. Concepts are dynamic and emergent from unique circumstances, yet allow~~ing~~ shared understanding and assessment. Exorcising the supernatural view of concepts from contemporary debates in education is an affirmative first step in developing a more specific account of learning.

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Key Words: Curriculum, concepts, multiplicity, ~~emergence~~powerful knowledge, Deleuze, Bergson

Introduction

The national curriculum for England (DfE, 2014) mentions concepts 56 times, specifying that in studying English students must learn concepts such as word structure and modal verbs; in Mathematics concepts such as fractions and zero; in Science concepts of force and evolution; in Computing concepts of logic and data representation. State-funded schools must teach these concepts as part of a curriculum which "prepares pupils at the school for the opportunities, responsibilities and experiences of later life." (DfE, 2014, p. 5). Concepts are thus characterised as being representational of some phenomenon of importance in the present and future world. However, it can also be seen that a concept does not relate just to a specific instance of the phenomenon: in learning the concept of force we are able to understand myriad different situations in which forces act; in learning about modal verbs we understand something about how words such as *must*, *could* and *might* function in sentences which are yet to be written. Thus characterised, concepts have an essential quality, which goes beyond the specific contexts in which they are learnt and applied.

At the heart of our education system lies the assumption that within the unique, complex context of a classroom, a student is able to acquire concepts which are universally applicable in representing a phenomenon in the world, and will be in the future. A more instrumentalist view might have it that through the activities of specific classrooms, young people acquire the concepts specified by curricula, and which are examined through standardised tests. In either view however, the relationship between unique contexts and experiences, and the acquisition of concepts as universally applicable representations is rarely questioned. This paper does just that, showing that a failure to question the relationship between the specific and the universal stems from assumptions about concepts which stretch as far back as Aristotle's essentialism, but have been integrated into cognitivist views of learning that have dominated education for the last few decades. After highlighting both the logical error and pedagogic implications of separating concepts from the material realities of classrooms, I will expound how considering concepts as *multiplicities*, after the work of Henri Bergson and Gilles Deleuze, provides a much firmer philosophical foundation for understanding concepts and how they are learnt.

Ghosts in the Curriculum

Osberg, Biesta & Cilliers (2008) highlight how prior to the sixteenth and seventeenth century, children learned through practices of *presentation*: directly participating in the world that they would become adult in. Although this changed at different times for different cultures and social strata, most contemporary societies now place their children in schools, where they are prepared for

later participation in 'real life'. This necessitates selecting what it is valuable for children to know: a *representation* of adult life.

This paper will only enter into current debates around the nature of curricula so far as to propose that such debates continue to engage with the relationship between concepts, as specified within curricula, and the world which they represent:

> "The relationship of knowledge to its referents and the way it is structured has implications for the way in which it should be included in curriculum." (Wheelahan, 2008, p. 5)

Yet in recognising the representational nature of curricula, we are left to consider how 'knowledge' actually manifests within the representations found in classrooms. Greater attention is required to the relationships between knowledge, classroom representation and phenomena in world.

To exemplify this need for greater attention, take Young & Muller's (2010, 2013) argument for the inclusion of 'powerful knowledge' within curricula. They argue that engaging with the specialist knowledge, which emerges from particular subject disciplines, should be a focus of curriculum making:

> "so enabling students to gain access to understanding [of] the world that takes them beyond their experience. It is this access to knowledge which takes students beyond their experience that must be the primary goal of schools." (Young, 2011, p. 269)

Yet how does a student access knowledge which takes them 'beyond their experience'; where does this knowledge reside, and how does the student acquire it *through* their experience? Young (2009) distinguishes between two different types of knowledge: *context-dependent* knowledge is developed in the course of everyday life. However, of *context-independent* knowledge, he says:

> "This is knowledge that is developed to provide generalisations and makes claims to universality; it provides a basis for making judgements and is usually, but not solely, associated with the sciences. It is context-independent knowledge that is at least potentially acquired in school, and is what I referred to earlier as powerful knowledge." (Young, 2009, p. 15)

If we assert that experiences in school are part of everyday life for young people, then this begs the question as to how universal, context-independent knowledge is learnt through particular educational contexts. Whilst Young's frame provides compelling sociological arguments about curricula, when focusing upon what happens in classrooms it begs questions as to how knowledge (powerful or otherwise) manifests in the unique settings in which people learn.

Within such discussions, curricular concepts are imbued with an essential or universal quality, in that they can be learnt and applied in various contexts. Evident in the quotes above from Young is that this tends towards a dualist account that separates essential, representational concepts from both the world in which pupils learn, and the world in which they will (one day) apply these concepts. That is to say that there is an implication that concepts have an existence beyond their particular manifestations. This is an error. Indeed, it is an error of the same type that Ryle identified in relation to Descartes' mind-body dualism:

> "'the dogma of the Ghost in the Machine'… is one big mistake and a mistake of a special kind. It is, namely, a category-mistake. It represents the facts of mental life as if they belonged to one logical type or category (or range of types or categories), when they actually belong to another. The dogma is therefore a philosopher's myth." (Ryle, 2009, pp. 5–6)

Ryle gives several examples of logical category errors, the first of which is someone being shown the colleges, libraries, playing fields, museums, scientific departments and administrative offices of Oxford or Cambridge but then asking where the university is. Descartes, Ryle argues, makes the same mistake in seeing mental states as different in type from the complex yet 'mechanical' nature of human bodies. He goes further in questioning where sensations cease and thought begins in considering mind as separate from matter.

In co-opting this argument for consideration of curricular concepts, we see that it is impossible to sustain a distinction between the understanding of individuals and the representational concepts specified within curricula. The acquisition of a curricular concept cannot be divorced from the brains, bodies, speech, gestures, texts, objects and equipment that are involved in learning. The category error of separating concepts from the material world has roots within classical essentialism, but we will see below that it has permeated into contemporary learning theory.

Classical Essentialism

Through his dialogues (in the middle period of his work at least), Plato seems to suggest that the objects and qualities of nature (*physis*) are but shadows of universal Ideal forms. Dogs, red objects, instances of love and of courage are all the multiple particular manifestations of the transcendent Idea of dog, redness, love and courage. True knowledge therefore, is to be found in the realm of Ideal forms. To Plato however, every particular object is subject to change and is determined by its particular circumstances. To distinguish ideal from particular in Plato's view, take the example of a circle. An Ideal circle has no specific radius or thickness of line, and every point on it is the exact

same distance from the centre. A particular circle has a determinate radius and is drawn with a finite thickness of line; its shape cannot be perfect.

Plato himself seems to return to a more sceptical view of Ideal forms in his later writings, and Aristotle (his student) actively argues against them, suggesting that such a framing is deficient in explaining how we arrive at knowledge of particular things, or why those things exist. Aristotle instead turns Plato's contention on its head, arguing that the essential forms of entities are to be found only in looking at their particular manifestations. It is important to note that Aristotle is not a substance dualist, as he considers essences as part of the fabric of reality. In this sense too he differs from Plato, and also the later dualism of Descartes. As Charles (2002) elucidates, Aristotle believes that the essential qualities of 'natural kinds' exist independently of our observation of them. Furthermore, whilst the Platonists contend that the layperson can discern natural kinds, Aristotle places the burden of proving claims about essences on 'metaphysicians'. It is possible for the layperson to understand and use terms associated with natural kinds, and for a master craftsperson to grasp something of what is possible with different kinds of material, but it requires metaphysical enquiry to explain why this is the case, through understanding essences themselves. This characterises knowledge as something to be aspired to, beyond the reach of the layperson; arguably this characterisation remains today.

It follows from Aristotle's essentialism that learning is about coming to understand the essential qualities of natural kinds. Concepts, thus framed, relate to the essential properties which constitute the nature of the world. It would be a disservice to the history of western thought to suggest that such a view has remained unchallenged since Aristotle. In this paper however, I will simply propose that much of this characterisation remains, and in broad brush strokes here suggest that it has a lineage through Descartes' metaphysical challenge to Aristotle, not to mention the forms of dualism advocated by Locke and Kant. Descartes separated mind and nature in a way that Aristotle did not, sowing the seeds of the mind-body dualism which Ryle finds worrying by the mid-twentieth century. As Charles (2002, p. 364) argues, Descartes and Locke both attempted to undermine natural kinds through suggesting more fundamental essential properties. However, this did not undermine essentialism itself.

The Classical View of Learning

Whether it was sustained or reawakened by enlightenment thinkers, the essential character of concepts derived from Aristotle was integral to the field of psychology in the mid twentieth century, as thinkers such as Piaget and Bruner developed their cognitivist accounts of learning. As

Krahenbuhl (2016) argues, such theories have come to have significant influence upon education. It is therefore worthwhile examining the echoes of essentialism in cognitivism.

In so doing, it seems that cognitivist theory owes something to Aritotle's logic as well as his essentialism. With the development of mathematical forms of logic in the 19th century, something of Aristotle's original intention around logic was recovered (Woods & Irvine, 2004). Within psychology, Smith & Medin (1981) defined the 'classical view' of concepts as having dominated much of the early exploration of learning. This view brought together a focus on the correct logical specification of categories of things in the world, with an essentialist characterisation of these specifications. As Murphy describes, within the classical view:

> "First, concepts are mentally represented as definitions. A definition provides characteristics that are a) necessary and b) jointly sufficient for membership of a category. Second, the classical view argues that every object is either in or not in a category, with no in-between cases." (Murphy, 2002, p. 15)

Concepts are thus defined by the essential properties which are necessary and sufficient to determine a category. In this view, learning is about the acquisition of the correct definition of a category of entities, and this may involve an increasingly sophisticated definition over time, as more nuanced examples of category membership are considered. This view is appealing as it aligns learning with overcoming insufficient definitions of the world, and allows the application of formal logic in considering concepts as categories. Whilst there were theoretical challenges to this view (most notably from Wittgenstein's (1953) philosophical Investigation), the classical view underpinned the assumptions of early cognitivist thought.

This inheritance of an essential characterisation of concepts can be exemplified through the work of Jean Piaget, perhaps the most well-known of all cognitivist theorists. It is clear that Piaget was concerned with mental representation:

> "There is certainly present to the child a whole world of thought, incapable of formulation and made up of images and motor schemas combined. Out of it issue, at least partially, ideas of force, life, weight, etc., and the relations of objects themselves are penetrated with these indefinable associations. When the child is questioned he translates his thought into words, but these words are necessarily inadequate." (Piaget, 1929, p. 27)

Here we see an account in which the "relations of objects themselves" are represented in the mind and the implication is that there is a correspondence between the relations in the world and the "world of thought". Piaget's (1951) ~~stage~~ theory of development argues that learning proceeds

through stages, with children first developing sensorimotor schema about the world, then having pre-operational concepts, then concrete operational concepts and finally being able to manipulate formal operations, with abstract logical concepts. Without being able to expand on this model here, it is important to note that the pinnacle of learning to Piaget is the acquisition of abstract "logico-mathematical structures" (Inhelder & Piaget, 1964, p. 281). As Murphy (2002, p. 318) argues, Piaget takes a classical view of concepts as specifying the essential characteristics of classes of objects. His experimental techniques often relied on a child being able to define a concept and answer logical questions about it, or to categorise objects correctly. Piaget gives an account of how abstract representations emerge, over time, from sensorimotor interaction with the world and (later) concrete operations (understandings of area, recognising the conservation of numbers of objects, seriation etc). Despite a focus upon the difficulties pupils have and the processes by which they learn, the essential character of knowledge remains within Piaget's cognitivism: logico-mathematical structures are characterised by Piaget as natural kinds.

To provide a further example, we might consider the work of Jerome Bruner who, like Piaget, is often labelled as a cognitivist. Also like Piaget, Bruner developed a theory of learning which shows a hierarchy, although Bruner's focus was on modes of representation, and looked beyond developmental biology to more social aspects of learning. Bruner (1966) describes different modes of representation with which children reason. *Enactive* representation, which develops from birth, is conceived of as unconscious learning associated with muscle movements. *Iconic* and *symbolic* representation however, which first appear in later stages of development, are characterised by a representation of the world which has some correspondence to it. Whilst enacted learning might be thought of as the adaptation of biological responses, iconic and symbolic representations imply the characterisation of abstract thought as pertaining to established concepts.

The issue in both Piaget and Bruner's characterisation of learning is the ontological separation between the sensorimotor and abstract representation. The hierarchies they introduce sustain the stratification of experiences in the world and the knowledge structures which are essential and universal. Via the classical view of concepts, separation of knowledge from the here and now is sustained. As I shall turn to now however, this ontological separation also supports the unnecessary separation of debates about *what* should be learnt in education, and research into *how* people learn.

The How and the What of Learning

The natural heir to cognitivist views of learning within educational theory is conceptual change research, which continues to investigate the way that the understandings of young people change

over time. DiSessa (2006) charts the history of conceptual change research, suggesting that Piaget's developmental view was critiqued in light of the observation that children bring their own ideas into classrooms, prior to formal teaching. Over time however, research on children's ideas fragmented into different accounts of how these ideas change over time, such that there remains no consensus around what conceptual change involves, or indeed what pupil concepts are (Clement, 2008; Rusanen, 2014). In following the lineage of cognitivist theorists, conceptual change researchers have struggled to define the dynamic, situated understandings of pupils in classrooms, and how they move towards the 'correct', essential understanding denoted by curricular statements.

The implication is that the individual, context specific ideas of pupils need to be transformed into the essential, universally applicable concepts specified by curricula. Curricular concepts are thus ghosts, always beyond the material circumstances of learning. In research into *how* children learn, the question as to *what* they are to learn is treated unproblematically. Conceptual change research seeks to understand how naïve ideas become 'correct' ideas. Yet the ontological separation of the two remains: correct ideas are to be aspired towards and acquired.

The separation of concepts from the contexts of learning also manifests in how we frame assessment. Assessment often rests on presenting pupils with a problem or situation, to which they must provide a 'correct' response. Such a response shows that the pupil has the knowledge, skill or competency specified by the curriculum. The assumption underlying this is that the specifics of the problem or context presented are secondary to essential understanding being tested. A well-designed assessment item gets to the heart of whether a pupil has the concept or not. Thus, the summation of scores on a test gives a meaningful measure of someone's conceptual understanding. If an 'incorrect' response is given however, this provides formative feedback on what is lacking; which concepts have not been yet learnt. Although assessment is a much nuanced thing, the assumption that a quantitative measure of conceptual understanding is meaningful betrays the assumption that concepts are things which have an existence beyond the contexts through which, and in which, they are assessed.

Earlier in this paper we saw how Young's account of powerful knowledge does not adequately account for how such knowledge manifests in the classroom. Through sketching a lineage of essentialism through cognitivist theories to contemporary research in conceptual change, we see the converse issue that knowledge is not adequately defined in relation to the situated understandings that pupils have in classrooms. Without being able to fully establish it here, it is certainly plausible that the ontological separation between the essential, universal concepts specified by curricula and the situated, individual understandings of pupils is impacting upon other contemporary debates in

education. The debate between so-called traditional and progressive views of education was being described as over-simplistic in this journal some forty years ago (Darling, 1978) and yet shows no sign of abating. At the heart of this debate appears to be a difference between those who argue for the importance of instilling established knowledge in the next generation of young people, and those who see learning as a process of meaning making, entwined with personal circumstances. Might such oppositions rest on whether proponents separate essential knowledge from situated representation? Furthermore, as Biesta (2007) points out, the means and the ends of educational practice have become separated in recent debates about evidence-informed practice. Again, how far of a stretch is it to see a separation of means and ends relating to a stratification of knowledge and processes of learning?

The separation between the aims and means of education, between the what and the how of education, has to do with the category error at the heart of how learning is characterised. With an inheritance from Aristotle through cognitive theories of learning, the ontological distinction between essential concepts and individual, situated understandings is, I believe, negatively impinging upon the way we conceive of curricula, learning and assessment. Debates around what should be represented in curricula cannot be separated from an understanding of what and how pupils learn within educational contexts. The individual ideas that pupils have cannot be separated ontologically from the concepts that we wish them to acquire. The contexts and problems presented during assessment cannot be separated from the responses of individuals. What is needed is a theoretical position which overcomes such separation.

In the second half of this paper I will develop such a position by reframing concepts as multiplicities, after the work of Henri Bergson and Gilles Deleuze. I offer this position as a way in which the specific, dynamic contexts of learning can be brought together with the knowledge, skills and competencies that we seek to develop in education.

Multiplicity

Gilles Deleuze set out to overturn reliance upon essences and representation, and in so doing directly challenge Platonism in relation to human thought (Tampio, 2010). To do so, Deleuze links two insights which he takes primarily from Bergson although, as we shall see, he reads these insights through several other philosophers. Firstly, Deleuze sees concepts[1] as impoverished in comparison to the world of human intuition, which includes affects and precepts as well as concepts (Deleuze &

[1] In Deleuze's later work he uses the term 'concepts' to denote the original products of philosophy. This is not the usage considered in this paper, which instead draws on Deleuze's work in contesting the use of the term concept within contemporary education.

Joughin, 1997, p. 165). Secondly, Deleuze draws on the term *multiplicity*, to challenge the dualism of the universal *one*, and the particular *many* which echoes through philosophy after Plato.

> "Ideas are multiplicities: every idea is a multiplicity or a variety. In this Reimannian usage of the word 'multiplicity' (taken up by Husserl, and again by Bergson) the utmost importance must be attached to the substantive form: multiplicity must not designate a combination of the many and the one, but rather an organisation belonging to the many as such, which has no need whatsoever of unity in order to form a system. …We can say 'the one is multiple, the multiple one' for ever: we speak like Plato's young men who did not even spare the farmyard. Contraries may be combined, contradictions established, but at no point has the essential been raised: 'how many', 'how', 'in which cases'. The essence is nothing, an empty generality, when separated from this measure, this manner and this study of cases. Predicates may be combined, but the Idea is missed: the outcome is an empty discourse which lacks a substantive. 'Multiplicity', which replaces the one no less than the multiple, is the true substantive, substance itself. The variable multiplicity is the how many, the how and each of the cases. Everything is a multiplicity in so far as it incarnates an Idea." (Deleuze, 2004, p. 230)

Deleuze's substantive use of the term multiplicity challenges dualist separation of Platonic Idea and specific contexts, but also monisms which collapse difference to a single substance. Riemann's mathematical work on the theory of complex numbers, and the use of geometry to analyse them, inspired Bergson's reflections upon multiplicities. As Deleuze notes:

> "This is a strange word, since it makes the multiple no longer an adjective but a genuine noun. Thus, he exposes the traditional theme of the one and the multiple as a false problem. The origin of the word, Multiplicity or Variety, is physico-mathematical (deriving from Riemann). It is difficult to believe that Bergson was not aware of the scientific origin of the term and the novelty of its metaphysical use. Bergson moves toward a distinction between two major types of multiplicities, the one discrete or discontinuous, the other continuous, the one spatial and the other temporal, the one actual, the other virtual." (Deleuze, 1988, p. 117)

Both types of multiplicities described by Bergson provide fresh insight into curricular concepts, and their relationship to the specific circumstances in which learning takes place. The type of multiplicity that Deleuze variably refers to as discrete, extensive, spatial, actual can be illustrated, as Bergson does, through consideration of a flock of sheep (Bergson, 1913, pp. 76–77). Despite being a homogeneous multiplicity, sheep can be enumerated because they are spatially distinct. The same

can be said of a wood or a crowd. This is not a claim that every sheep, tree of person is identical, but that they are counted as homogenous in labelling the multiplicity. An actual multiplicity denotes a set of repeated (but not necessarily identical) instances of a phenomenon, the constituents of which are nevertheless distinct according to their particular circumstances.

When referring to modal verbs, fractions, forces or data representation, the national curriculum for England is actually referring to a multiplicity of specific instances. Each physics problem which involves forces is different, and presents a different context. Each instance of a modal verb is situated within a different sentence. In this sense the contexts presented within curricular materials are unique, and it is these that young people learn from. However, even when the same examples and problems are used in different classrooms, they are within different contexts: different teachers and classmates, different rooms and environments. Considering actual multiplicities thus reframes concepts through recognising that each instance of a concept is unique on at least two levels: the specific examples used and the context in which they are used. Thus, seeing concepts as actual multiplicities has consequences for how we consider learning and assessment, which will be developed later within this paper.

However, recognising that the specific instances of concepts that pupils learn from are unique, does not fully capture the role of concepts within learning. As diSessa (2006) observed in his history of conceptual change research (cited earlier), there has been considerable interest since at least the 1970s in the ideas that children bring with them into the classroom, and these situated, often unique understandings can be better understood by drawing upon the other form of multiplicity denoted by Bergson and Deleuze: continuous, temporal, virtual. During learning, the conceptual understanding of an individual is always changing. In Deleuze's terms, learning is a process of constant *becoming*, and as Lawlor and Moulard (2013) note, virtual multiplicities are at the heart of this philosophy of 'becoming'. So when Deleuze (1983, p. 23) says that "there is no being beyond becoming, nothing beyond multiplicity", he is suggesting that multiplicities are inextricably linked to processes of becoming, and that 'being' cannot be seen as a separate, static state beyond this.

In order to develop a view of learning as involving virtual multiplicities, I will first outline Bergson's consideration of *duration*, and how Deleuze uses it to distinguish the virtual from the actual. I will then show how Deleuze further draws on notions of *repetition*, taken primarily from Hume, and *affirmation*, from Nietzsche. Bringing these together allows Deleuze to reframe concepts in relation to multiplicities, and this will provide a powerful recharacterization of the concepts presented in curricula.

Difference, Repetition and Affirmation

Actual multiplicities denote the entities in the world which we see as homogenous, and which can be enumerated, despite their differences. Such multiplicities are amenable to scientific study, are the subject of common sense and, as Tampio (2010) suggests, align to Platonic metaphysics. Actual multiplicities denote regularities or patterns in the world. Virtual multiplicities on the other hand denote the continuous, innumerable quality of things like moods or psychological states. However, such multiplicities are not to be positioned as ontologically different from the real world inhabited by actual multiplicities:

> "*The virtual is fully real in so far as it is virtual*. Exactly what Proust said of states of resonance must be said of the virtual: "Real without being actual, ideal without being abstract"; and symbolic without being fictional." (~~G.~~ Deleuze, 2004, p. 260 [original italics])

The reference to Proust offers a way into thinking of the virtual. Indeed, Bergson married a cousin of Proust, and influences can be found throughout Bergson's writing. Ansell-Pearson (2005) describes the narrator in Proust's *À la recherche du temps perdu* contemplating how aspects of the present, such as uneven paving stones, prompt the recall of a place such as Venice. The memory of Venice does not contain the paving stones in the present, yet the coming together of the memory and the present creates a reaction in the narrator. Deleuze sees in this the 'crystallisation' of the past in the present, which evokes the idea of Venice. The virtual allows the importance of history in being able to influence the present, and as such denotes the source of difference between one moment and the next. Yet in being 'virtual' we do not need to ascribe the idea of Venice to some other realm of 'possibility', the virtual is present in the real world, it is "real without being actual".

Deleuze suggests that "From Time and Free Will onward, Bergson defines duration as a multiplicity, a type of multiplicity" (Deleuze, 1988, p. 117), and so we see the links between virtual multiplicity and Bergson's duration.

> "pure duration excludes all idea of juxtaposition, reciprocal exteriority and extension" (Bergson, 1946, p. 192)

In Time and Free Will, Bergson set out to challenge Kant's mixing of space and time which leads to the contention that human action is determined by something beyond these. Space is extensive, which allows homogenous multiplicities to be enumerated. To Bergson however, time is intensive and continuous; one moment cannot be separated from the next in our experience of time. Science after Kant has used spatial metaphors to enumerate and graphically represent each moment in time as separate and distinct. However, in arguing for time as duration (*la durée*), Bergson wishes to restate the inseparability of the present and the past in how we experience time. It is this that

Deleuze picks up in consideration of virtual *difference*, and which explains how memories of Venice might be stimulated in a completely different context.

Famously Bergson became engaged in a dispute with Einstein about the nature of time, arguing that his general theory of relativity was a philosophical rather than physical theory, which necessitated differences in how time is perceived (Canales, 2005)[2]. Whilst Bergson's conception of time was dismissed by scientists in the early twentieth century, it pre-empted aspects of quantum physics (de Broglie, 1941) and is instrumental in the contemporary understanding of emergence within science (Osberg, 2015). In an interview, Deleuze says:

> "I feel myself to be a pure metaphysician.... Bergson says that modern science hasn't found its metaphysics, the metaphysics it would need. It is this metaphysics that interests me" (Villani, 1999, p. 139)

In seeking such a metaphysics, Deleuze argues that Bergson evolved his notion of duration over the course of his work: "Duration seemed to him to be less and less reducible to a psychological experience and became instead the variable essence of things, providing the theme of a complex ontology" (Deleuze, 1988, p. 34). Therefore, Deleuze subsumes Bergson's duration within his own notion of the *event*, which is less reliant upon human sense (Smith, 2005). Deleuze thus "tries to develop a metaphysics adequate to contemporary mathematics and science—a metaphysics in which the concept of multiplicity replaces that of substance, event replaces essence and virtuality replaces possibility." (Smith & Protevi, 2015).

To Deleuze, every event emerges from the actual and virtual conditions of the moment, and every moment is therefore necessarily different from others. This *difference* means every encounter with a verb, fraction or graphical representation is unique, both because it is spatially and contextually different from others, but also because the past is always (virtually) present. We learn from and within unique events.

The question thus becomes how we can consider coherent concepts at all, if every situation is unique; every event is different. The answer once again has traces is Bergson's work:

> "sensations and tastes seem to me to be objects as soon as I isolate and name them, and in the human soul there are only processes. What I ought to say is that every sensation is altered by repetition, and that if it does not seem to me to change from day to day, it is

[2] This dispute may have prevented Einstein receiving the Nobel Prize for relativity. After several years of discussion, he instead got it for 'services to Theoretical Physics, and especially for his discovery of the law of the photoelectric effect', the latter being a more tangible physical effect, observed in experiments at the time.

> because I perceive it through the object which is its cause, through the word which translates it." (Bergson, 1913, p. 131)

Deleuze however reads Bergson's reference to repetition through Hume's empiricism.

> "*Repetition changes nothing in the object repeated, but does change something in the mind which contemplates it*. Hume's famous thesis takes us to the heart of a problem" (Deleuze, 2004, p. 90)

For Deleuze, understanding emerges from encountering spatial, actual multiplicities: repeated yet different events, which we nevertheless associate with the same concept. In a radical reinterpretation of Hume's treatise, Deleuze explains how 'human nature' involves identities, relations and institutions as 'artifice', continually being invented by humans (Deleuze, 2005, p. 47). Counter to the tradition of Plato and Kant, concepts are not universals or transcendental qualities which manifest in unique circumstances. Deleuze's *transcendental empiricism* instead shows how we learn the identities and relations which constitute concepts through repetition of similar experiences.

> "The principle of habit as fusion of similar cases in the imagination and the principle of experience as observation of distinct cases in the understanding thus combine to produce both the relation and the inference that follows" (Deleuze, 2005, p. 41)

Yet relations and inferences do not exist in in an ontologically distinct realm of 'knowledge', they exist within the material and social world. This has immediate consequence for how we characterise curricular concepts in that they do not denote universals which are acquired, instead they signify multiplicities of different actual situations which pupils learn from. Moreover, concepts are not static, measurable mental entities. Concepts are virtual multiplicities for each person, continually in a state of becoming at every repetition of (different) experience.

Our empirical experience within the world conditions our understandings: we learn from the world around us. However, in drawing on Nietzsche, Deleuze shows that this does not necessitate a determinist view, nor do we replace fixed identities (Being) with an intractably dynamic world (Becoming):

> "Becoming is no longer opposed to Being, nor is the multiple opposed to the One (these oppositions being the categories of nihilism). On the contrary, what is affirmed is the One of multiplicity, the Being of becoming. Or, as Nietzsche puts it, one affirms the necessity of chance." (Deleuze, 2005, p. 86)

It is this *affirmation* which allows us to have agency in the world. In considering Nietzsche's eternal return: the prospect of time repeating itself, we are forced to affirm the world we experience, but "Nietszche's secret is that *the eternal return is selective*" (Deleuze, 2005, p. 88, original italics).

Deleuze takes from Bergson and Hume an understanding of how learning comes from the different, repeated events in the world. From this we learn concepts which are not transcendental or universal, but are the 'artifice' of humans as an inventive species. Yet each person has a conceptual understanding which is a virtual, continuous multiplicity: born of unique experiences and thoughts and continually in a state of becoming. This allows for the affirmation of difference, the continuous creativity of human thought and action.

Curricular Concepts as Multiplicities

In introducing Deleuze's final work, Rajchman suggests that Deleuze's 'last message' came at a time when philosophy was facing difficulty:

> "As with Bergson, one needed to again introduce movement into thought rather than trying to find universals of information or communication – in particular into the very image of the brain and contemporary neuroscience." (Rajchman 2005, p. 20)

In drawing on Deleuze's work, and its philosophical lineage, the recharacterisz~~z~~ation of curricular concepts has the potential to 'introduce movement' into our consideration of learning once more, counter to a view of brain and cognition as acquiring static concepts which are essential to the life that pupils will one day lead.

To understand how recharacteriz~~s~~ing concepts as multiplicities might add movement into the consideration of curriculum, take Wallin's (2010) observation that *currere*, the Latin 'to run', forms the basis of the term 'curriculum'. He argues that a curriculum therefore denotes a pedagogical course, but that a focus upon acquiring transcendent concepts suggests a need to plan and implement a fixed course between points. In recognising the unique nature of each context, and affirming the differences therein, the pedagogical course becomes one that will emerge from the actual and virtual conditions of each moment. Movement is introduced when it is acknowledged that curricular statements are signifiers, flags that denote points to explore, on territory this is ever changing.

How then might this recharacterisz~~z~~ation of curriculum shed new light on the 'powerful knowledge' that originates from disciplines? Curriculum studies already recognise a difference between the intended, planned and enacted curriculum (Kurz, et al., 2010). Furthermore, theorists such as Young (2011) recognise (after Bernstein) that curricula recontextualise disciplinary knowledge as the basis

for school subjects. To instead adopt Deleuze & Guattari's (2004) term, a *reterritorialization* takes place whereby a concept (as multiplicity) takes on a new set of relations and dynamics as it is introduced into a new 'territory'. The mistake, I suggest, is in focusing on the curriculum as the territory where disciplinary knowledge takes on new meaning. A curriculum alone can never carry the full weight of disciplinary knowledge. Putting together a set of curricular statements undoubtedly establishes new connections and context, but these only take on meaning for pupils when enacted in the classroom. The pedagogical course to be run can only be established relative to the territory of a particular context, and that context involves the specifics of place, material resources, people, relationships, motivations, and everything else that teachers engage with.

What might surprise those that spend time in schools in England is that the national curriculum, at its heart, acknowledges this. The Expert Panel for the National Curriculum Review (DfE, 2011) made clear that the National Curriculum is a subset of a *Basic Curriculum*, which also sets out requirements for religious education, sex education and careers guidance. Drawing on the Education Act 2002 though, they argue that the Basic Curriculum is part of a *Local Curriculum*, whereby schools and communities determine the educational provision which they deem appropriate. The Expert Panel also directly cite Young in considering the 'powerful knowledge' that pupils should engage with. These dual concerns for powerful knowledge and a local curriculum are upheld in the aims statements of the current national curriculum:

> "3.1 The national curriculum provides pupils with an introduction to the essential knowledge that they need to be educated citizens. It introduces pupils to the best that has been thought and said; and helps engender an appreciation of human creativity and achievement.
>
> 3.2 The national curriculum is just one element in the education of every child. There is time and space in the school day and in each week, term and year to range beyond the national curriculum specifications. The national curriculum provides an outline of core knowledge around which teachers can develop exciting and stimulating lessons to promote the development of pupils' knowledge, understanding and skills as part of the wider school curriculum." (DfE, 2014, p. 6)

Deleuze's consideration of multiplicities allows us to contest the use of the term 'essential' here: it should not denote an Ideal realm, but recognise that multiplicities are different in every context, and always in a state of becoming. Introducing pupils to knowledge which is powerful in furthering their lives is of course desirable, but we must recognise that this knowledge is gained through engaging with multiplicities that differ in every reterritorialization.

The aims of the current national curriculum for England promise space for teachers to therefore explore the contexts and territories of the learners they support and guide them towards the powerful knowledge signified by curricular statements. In my work with teachers however, the primary response when I show them this statement is laughter at its absurdity in relation to the current reality in schools; there simply is no space for teachers to do this. The Local Curriculum, as conceived in the process of curriculum reform, has been squeezed out. It cannot be established here whether this took place when a long list of curricular statements was added to the curriculum for each school subject, when examination boards, publishers and schools interpreted the curriculum, or when assessment regimes failed to deviate from the high-stakes checking of concept acquisition.

If we are to begin to reinstate the recognition that learning is always local, then we must replace the ghosts of static, essentialist concepts with recognition that concepts are always in a state of becoming. If curricular statements are seen to denote fixed points at which concepts are acquired, then schooling becomes a set path, impervious to different territories of thought and action which make up life. After Deleuze, we see that the knowledge signified by curricula enters a classroom not as ethereal concepts, but in particular, messy and dynamic multiplicities which pupils engage with. As such, when we refer to modal verbs, data representations or force, we are referring to multiplicities. These multiplicities take on new meaning within the territories which constitute each classroom though, and they only form a part of what is being engaged with and learnt from in classrooms. 'Knowledge' in the classroom is embued with the affective and normative aspects of social interactions. Young people don't just gain disembodied knowledge in classroms, they learn about life. The means of education cannot be separated from the ends of education, the *how* and the *what* are interlinked. Or, as Dewey says, we must:

> "Cease conceiving of education as mere preparation for later life, and make it the full meaning of the present life." (Dewey, 1893, p. 660)

By seeing curricular statements as signifiying multiplicities, we begin to recogenise the role of curricula in the much broader project of education. Curricula do not prescribe an educational course, they signify 'the best that has been thought and said', and this is the very artifice of human endeavour. Counter to the characterisation provided by Young and others however, this powerful knowledge does not take young people 'beyond their experience', it conditions the actual educational experiences they have. Deleuze's consideration of multiplicities thus adds 'movement' back into the consideration of learning, by asserting that curricular concepts are reterritorialized in unique contexts, and it is in those contexts that education takes place.

Education and Events

Contending that multiplicities have unique manifestations is not to suggest that learning cannot be transferred to new settings. Actual multiplicities denote regularities in the world, and I have suggested that learning is a process of engaging with repetition and difference as we each learn about these regularities, be they verb use, analysing forces or representing data. However, recognising that learning takes place through a series of unique events has implications for how we characterise pedagogy. Learning can no longer be thought of as a process through which ethereal concepts are developed in minds or social groups. Whether instructing pupils directly or engaging in collaborative group work, teachers condition the patterns of thought and action that young people experience. It is those patterns which pupils take forward into their lives. Recharacterising concepts thus draws attention to the specific patterns involved in learning. If a pupil learns to recognise modal verbs by highlighting them in sentences, then they learn little about the literary effects of 'shall', 'will' and 'ought' in a political speech; applying air resistance to an aeroplane represented by a point (a free body diagram) tells the learner little about aerodynamics; following instructions to draw a scatterplot does not alone teach someone how to interpret trends. Focusing on concepts has masked the specifics of learning by separating the *how* and the *what* of education. By recognising multiplicities, we see that the two cannot be separated.

To exemplify this, consider the attention which is currently being given to the development of memory in education, and how the spacing, repetition and interleaving of activities supports recall[3]. Framing learning as involving repetition, after Deleuze, might be seen as commensurate with such work: semantic memory is built upon repeated episodes. However, recognising these episodes as *events* in Deleuze's terms, necessitates attention to specifics. Specific associations and thought processes are engendered by specific activities in the classroom, but these are situated within the affective dimensions of interest, motivation and relationships. They are also embodied within the specific material constituents of classrooms. Whilst understanding of memory may (or may not) have much to tell educationalists, once one removes reliance upon disembodied, acontextual concepts, the question becomes what it is that is being remembered? The understanding of learning, or memory formation for that matter, cannot be advanced on the basis of an essentialist view of concepts.

The need to focus on the specifics of learning will not come as a shock to many teachers, and as Shulman (1986) was arguing some thirty years ago, teachers do not just need to know the subject content to be conveyed. Teachers come to understand pedagogic approaches, how to sequence

[3] For example, much work by the Educational Endowment Foundation in the UK focuses on the impact of these strategies from cognitive science.

learning, the difficulties that young people commonly have, but more closely what the pupils they work with might be interested and engaged by, and how curricular content relates to their lives. This is the local curriculum that has yet to find space or be made explicit in many schools. Recognising the specifics of learning, and how multiplicities are reterritorialized in specific contexts, takes consideration of learning and pedagogy beyond the explicit however. If pupils learn through the repeated, yet different events of classrooms, then what else do they learn? To draw on Biesta (2007) once more, the means of education are not inert with respect to its ends. Pupils learn about gender roles, power relations, competition, what is valued in (school) society, how to dress, how to behave, and take from their encounters with 'subject knowledge' some sense of what academic disciplines have to offer.

Enquiry into learning and pedagogy must move beyond a focus on how concepts are acquired towards what is actually happening in classrooms. How is disciplinary knowledge reterritorialized in the classroom? What is being learnt about disciplines and their role in the world? What is being learnt more broadly about society and living within it? In suggesting that contemporary curricula have been taken as synonymous with fixed courses, Wallin (2010) highlights the impoverished image of life presupposed by a transcendent and representational framing of curricula. He instead offers a *pedagogical life* which is open to the creative processes of 'concept creation' advocated within Deleuze and Guattari's work. Our current education system seems a long way from this, and yet moving away from focus on concepts and instead focusing on the events through which people learn seems to me to present considerable merit. Focusing research and scholarship on what is actually learnt in classrooms, and how it is learnt, would surely open up discussion about what and how we want young people to learn. That will undoubtedly involve the desire to pass on knowledge which has been hard won through human history. However, this must be situated in the broader project of education as we seek to better understand how disciplinary knowledge is reterritorialized in classrooms and the lives of pupils.

This cannot be done without a shift in how we understand curricula, learning and pedagogy beyond an essentialist view of concepts. It cannot be done without an associated shift in how we frame assessment though.

~~As well as allowing us to recharacterize curricular concepts, consideration of multiplicities changes how we see learning. Through Bergson's duration, and Deleuze's difference we are forced to recognise that the conceptual understanding of any individual (be they an amateur of professional) is in a process of becoming, made up of continuous multiplicities. This means that the intuitive~~

~~experience invoked by an event may differ, even when the same event is repeated. And yet we do not each have completely different understandings: we are able to communicate, collaborate and engage with the practices, ideas and representations which constitute our shared knowledge. Through engaging with specific situations, our thoughts and actions are shaped by people, artefacts and environment. We learn about concepts as the 'artifice' of human life, through difference and repetition. These concepts are multiplicities: both the one and the many of our learning.~~

~~Gorodetsky on nomadic teaching~~

~~Assessment and Meaning~~

~~Recognising concepts as multiplicities has consequence for how we consider assessment too.~~ When we present a pupil with a question or problem, we are not assessing their possession of an essential concept; we are evaluating their response to the context presented, and the context in which they are situated. This evaluation involves a normative judgement which reconciles the response with our own understanding, or with a mark scheme or criteria which purport to represent a phenomenon. With learning and feedback, a pupil's responses to different problems become more sophisticated and resilient, meaning that they are more likely to be evaluated as 'correct'. Yet this correct conceptual understanding does not shift to a different ontological plain, it is the one and the many of different and repeated experiences. This highlights the dynamic, context specific and ultimately imperfect nature of assessment. A pupil may of course give the 'incorrect' response to a problem whilst having excellent understanding, or a 'correct' response with very little understanding. Assessment is an event in which continuous multiplicities collide: the dynamic conceptual understanding of an individual and the particular manifestation of a curricular concept.

Moreover though, shifting to a broader appreciation of what is learnt through the events of education begs questions about what is not being (formally) assessed. If assessment is able to move beyond checking whether universal concepts have been acquired, then we might pay greater attention to the meanings given to concepts within pupils' lives, and within particular contexts. Here teachers are much better placed to make judgements than standardized tests. We might also begin to evaluate what pupils have actually learnt through schooling. In short, assessment may be able to start evaluating whether young people have become educated.

By exorcising the ghosts of essentialism from how we view concepts, we are forced instead to recognise the role of specific, emergent events in relation to curriculum, learning and assessment. Seeing a concept as a substantive multiplicity shows us that the particular and universal are one and the same. This provides a theoretical basis for developing a more detailed understanding of

pedagogy and assessment, and for underpinning research into each of these, focused upon the specifics of unique events. There is of course a great deal still to be done to develop a more specific, detailed account of learning and teaching, and how this features within the educational life of a person. As fields like cognitive science and neuroscience grow, as well as technologies which may support and evaluate learning, it will be increasingly important to have a sound theoretical foundation on which to build. Exorcising the ghosts of essential, intangible concepts and instead recognising multiplicities as the myriad and messy events of learning, is an affirmative first step.

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