A Problem for Cognitive Load Theory – the Distinctively Human Life-Form

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Cognitive load theory has challenged contemporary approaches to teaching by arguing that they are ineffective because of a neglect of the psychology underpinning learning and, specifically, the high demand placed on working memory. This paper challenges the presuppositions involved not only in arguments for guided instruction by those supporting cognitive load theory, but also in opposed pedagogic approaches involving discovery and inquiry learning. Both approaches are in danger of presupposing what C.B. MacPherson criticised as 'possessive individualism' – i.e. capacities, beliefs and desires viewed as possessions of an individual. As a result, they fail to pay attention to mediation and normativity, both of which are distinctive aspects of human action. Examining this in more detail entails consideration of fundamental issues concerning human knowledge and understanding. An appreciation of the significance of normativity and mediation leads us to the philosophic works of Marx, Vygotsky, and Wittgenstein, and in particular to Brandom's Inferentialism. The philosophical ideas here have direct implications for pedagogy.

A famous story tells of the economist Piero Sraffa challenging Wittgenstein's conception of representation and meaning by making a Neapolitan gesture conveying scepticism, brushing his chin with his fingertips.[i] Wittgenstein characterised the impact of his conversations with Sraffa as leaving him feeling 'like a tree from which all branches have been cut' (Sen, 2003, p.187).[ii] But what was *so* radical about the arguments that Sraffa put forward? Why did they have such a dramatic impact on Wittgenstein that they, as he claimed, precipitated his move from conceiving meaning in representational terms to understanding its function in accord with rules in a holistic system? Was it significant that Sraffa spent many years in conversation with Gramsci and arranged for the *Prison Notebooks* to be published? Sen argues that the change in Wittgenstein's thinking, due to the influence of his conversations with Sraffa, involved a radical adjustment that could be put simply as conceiving mind and meaning in terms of activity. Wittgenstein credited the movement in his thought to an anthropological way of seeing things.[iii] It is this emphasis on activity that can be found not only in Wittgenstein (who, according to Brandom, rediscovered Hegel's 'understanding of content in terms of use, his inferential holism [and] the crucial role he sees the actual history of their application making to the content of concepts'[iv]), but also in Hegel and, of course, in Marx. In the *Economic and Philosophic Manuscripts* Marx demonstrated his roots in Hegel's philosophy when he wrote: 'The great thing in Hegel's Phenomenology and its final result . . . is simply that Hegel grasps the self-development of man as process . . . that he thus grasps the nature of work and comprehends objective man . . . as the result of his own work . . . he grasps labor . . . as man's act of self-creation' (Marx cited in Wood, 1988, pp. 67, 75). The idea that human beings are an ongoing creation of their own activity immediately places thought on a different footing. It breaks with the dualist idea of thought or mind being something inner, separate from reality, and opens the space for the investigation of mind that resists a cognitivist or mentalist approach, and this is crucial. This paper will attempt to bring out aspects of these ideas through the examination of a contemporary educational issue that has become a significant focus of attention, particularly in the Anglo-American context of state provision of education. In doing so it is not making direct claims for the validity of the

particular approach adopted; rather it seeks to use the ideas heuristically to open up an area fraught with tension and dissent.

A Contemporary Debate – Instruction or Inquiry

In the UK a heated debate about the content of teaching is again at the fore, driven in part by the development of free schools and, more recently, by the Office for Standards in Education, Children's Services and Skills. But this debate addresses only a contemporary form of an age-old issue – the relationship between teaching and learning. The sides of the debate draw on apparently opposed presuppositions. It is the aim of this paper, however, to show the opposing parties share a significant deal of ground in common, for both positions neglect the *sui generis* character of human activity, the distinctive human life-form. Underpinning the argument made here is that lack of recognition of the distinctive nature of human activity has significance and implications for both philosophy and education (see Kern, 2015, 2019; Rödl, 2007; Bakhurst, 2015; Misawa, 2017).

A focal point of the debate is reputed to be *'a now-seminal piece of research that threatened to blow the doors off an often-accepted orthodoxy in teaching: that students learn best when they discover things by themselves'* (ResearchEd, 2018). An influential article by Kirschner, Sweller and Clark pointed to extensive empirical evidence suggesting not only that direct instruction was far superior to discovery learning as a pedagogic approach, but also that those least able benefited most from direct instruction (2006).[v] The implication, they argued, was that anyone concerned with social justice should recognise the inadequacy of discovery learning and support direct instruction. They argued that guided instruction by an expert was most effective for learning, supporting their argument with a psychological account pointing to the *cognitive load* (high demand on working memory) involved in discovery learning, which, without appropriate *schemas*, prevented learners from acquiring new knowledge.[vi] This paper does *not* take issue with the empirical evidence used to motivate their argument; indeed, for the purposes of the argument here, it accepts the empirical evidence as it stands. The impact of Kirschner *et al.*'s original paper may, at least in part, be the result of the recognition by practitioners that something goes wrong with inquiry approaches to learning. This paper does, however, contest the form of explanation provided to account for the statistically significant difference visible in the empirical evidence, arguing instead that what is missing on both sides of the debate – direct instruction versus inquiry learning – is attention to a distinctive aspect of *human* activity. One aspect of this neglect is failure to appreciate the significance of norms and their role in the mediation of human action and, as a result, the consequences for how we think about learning and teaching. This might seem strange given that one side of the debate – learning by inquiry – appears to emphasise the activity of learners, but my argument here is that the presuppositions informing this sense of activity do not do justice to the distinctive nature of humans; rather they serve as an inadequate substitute for a process that is more complex and insufficiently spelt out. The form of explanation provided by the authors is wrong. and that this error plays a role in perpetuating the polarisation of the debate. Kirschner *et al.*'s cognitive explanation for the failure of inquiry learning can be replaced by the non-psychological account[vii] provided by inferentialism, and an explanation of this form can accommodate not only what those advocating learner-centred approaches are concerned with, such as access and social justice, but also core knowledge (emphasising the teaching of facts while giving due recognition to distinctive human capacities) (Kern, 2017; Rödl, 2016).

Cognitivism or Systematicity?

What presuppositions can we detect in cognitive approaches to the mind?[viii, ix] Any account here must present a caricature, but this can serve as a heuristic. Presented in 'folk psychological' terms, the individual is viewed atomistically as 'essentially the proprietor of his own person or capacities',[x] which include: intelligence; cognitive capacities such as memory; the ability to process information; and such personality characteristics as desires and wants, crucially 'owing nothing to society for them'[xi] (MacPherson, 1962, p. 3). This approach to capacities and characteristics contrasts with the approach that views an individual's self-conscious awareness in terms of recognitive reciprocal interaction with others, the individual's capacities being actualised in social interaction through social practices that form the historical development of knowledge. In the former view, mind is distinct from world, and representations depict states of affairs; in the latter, mind and world are not separated, and inferential connections, arising through human activity, constitute representations in the first place. These different presuppositions clearly have implications for anyone concerned with the nature of thought, mind, and reason, including those involved in teaching and learning, as the assumption that the individual *possesses* a set of capacities has implications for how those capacities may be understood to develop. [xii]

Before considering these different presuppositions, it is helpful to turn to a concrete example concerning critiques of the learner-centred (inquiry) approaches. Nick Gibb, Minister of State for School Standards at the Department for Education UK, points to a history lesson where he observes what he takes to be evidence of a pedagogic approach concerned with skills such as 'constructing historical narratives, explanations'. He explains that the class 'had a portrait of Henry VII on the interactive white board and they had to intuit from that piece of evidence things about Henry VII. . . Children were coming up with things like "Henry VII must have been rich" and "he was full of himself", and I don't think that's a very good use of time in a tight timetable at school. They really ought to be learning the actual knowledge – the story of the history.'[xiii] Gibb's concern was that the children were not learning history but were imputing their own impressions, which had little or no bearing on the actual historical evidence (concerning Henry VII). On the face of it, it would seem that the students were asked to come up with their impressions of the portrait. Gibb's worry was that they were able to do this on grounds that bore little relation to the 'facts' involved in the relevant history. Although a simplistic illustration and not in the broader context of a series of lessons, the teacher's approach here is based on the ideas informing 'inquiry learning', with the students attempting to 'discover' or 'build' knowledge for themselves by making their own judgements on the basis of a portrait of Henry VII. According to Gibb, without the relevant historical knowledge, and in particular the relevant historical facts, the students were not in any sort of position to make a *historical* judgement.[xiv]

Clearly history is interpreted in various ways, but those interpretations owe their validity to what can be characterised as the distinctive character of the concepts that emerge as disciplinary knowledge develops. If concepts are understood primarily in representational terms, what they involve, particularly in relation to pedagogical considerations, will be ignored. A helpful way to illuminate the characteristics of the form of academic concepts is to draw upon the distinction between scientific (academic[xv]) and everyday concepts made by Vygotsky. Taking the example of a child learning Archimedes' Principle, Vygotsky distinguishes the concepts that a child comes to learn and apply into two broad categories – everyday concepts and scientific (academic) concepts. According to Vygotsky, the child learns the concepts involved in Archimedes' Principle in a different way from those used in everyday life. The scientific concepts form part of a system of concepts that govern each other's meaning because of their relation with one another. By contrast, everyday concepts such as 'brother' are used to refer directly to people, objects and events that form part of the child's (everyday) daily experience.[xvi] For Vygotsky, what is crucial, in the case of scientific

concepts, is the presence of a system that allows for conscious awareness and a degree of control.

Although the following experiment is used to illustrate the development of children, it serves to provide an example of the differences arising from the system or lack of system in which meaning is made available to learners. In what is now considered a classic experiment, Martin Hughes devised a task to examine the ability of young children to take a perspective other than their own. He did this, while working with Margaret Donaldson, in order to put the original findings of Piaget and Inhelder's mountain task experiment (Piaget and Inhelder, 1967) to the test. Piaget had investigated the thinking of young children through a variety of experiments designed to test their egocentrism. These included their capacity to conserve different qualities such as quantity and height following changes and the ability to 'perspective-take'. The ability to abstract from a concrete context by decentering and seeing the world from a point of view other than one's own is considered crucial to reasoning and thinking abstractly.

Piaget's experiments demonstrated the failure of young children to conserve and also to perspective-take. In the mountain task a child was required to sit at a table in front of a model of three mountains which were distinguished by snow on one, a house on another and a cross on the third. A doll was placed on the other side of the table and the child was asked 'what does the doll see?' The child would be shown pictures of the scene from different angles or asked to rearrange three cardboard mountains to show the perspective of the doll. Children, below the age of seven, generally showed only their own perspective and failed to decentre.

In the redesigned version of the 'Three mountain task' the child was instead presented with a scene in which a 'naughty' doll hides from a policeman doll. Two walls intersect, forming a cross, with a policeman doll placed in one position, with only two quadrants visible. The naughty doll is placed on the opposite side, facing the other two quadrants and thus is hidden from the policeman's view. In this design of the perspective-taking task, children succeeded in knowing where the naughty doll should stand in order not to be seen by the policeman – i.e., they could take a perspective (the doll's) other than their own. Donaldson and her colleagues explained this success in terms of the fact that the task 'requires the child to act in ways which are in line with certain very basic purposes and intentions (escape and pursuit) . . .' (Donaldson, 1978, p. 24).

Donaldson and Hughes argued that the children had insight into the motives and intentions of the characters involved in the policeman task and that such insight was absent in Piaget's mountain task. However, something else was present in Hughes' experiment. A further explanation for the ability of children to perspective-take in the redesigned task, it could be argued, is due to the systematic structure of the task. The relationship of one element to another is made clear, making visible the 'reasons that follow from' and the 'reasons that are implied by' the task's events. In the mountain task, elements have no particular relation to one another, whereas in the policeman task they are directly connected.

Vygotsky criticised Piaget's early work for his account of egocentrism and for his failure to consider the nature of conscious awareness and to take into account the distinctive conditions in which this arises for the young child. Vygotsky argued that *'conscious awareness enters through the gate opened up by the scientific concept'* (Vygotsky, 1987, p. 191) and that this was due to the systematic nature of scientific concepts: 'the scientific concept assumes some position within a system of concepts' (Vygotsky, 1987, p. 192). Quoting Marx, he stated: '"If the form [in] which a thing is manifested and its essence were in direct correspondence, Science would be unnecessary". . . The scientific concept would be superfluous if it reflected the object in its external manifestation as an empirical concept. The scientific concept necessarily presupposes a different relationship to the object. . .'

(Vygotsky, 1987, p. 193) – i.e. one that is mediated by other concepts. The systematicity of one concept relating to another arises as humans attribute significance to everything they engage with, and to the resulting role that particular concepts perform. The constitution of meaning is possible due to this systematic character.[xvii] Conscious awareness in the child relies on access to a system of concepts rather than some notion of a simple empirical relation. Vygotsky explains: 'Only within a system can the concept acquire conscious awareness and a voluntary nature. Conscious awareness and the presence of a system are synonyms when we are speaking of concepts, just as spontaneity, lack of conscious awareness, and the absence of system are three different words for designating the nature of the child's concept' (Vygotsky, 1987, p. 191-192).

In the mountain task the child's response is unconstrained and there is no requirement to see elements in any particular relation to one another. However, in the policeman task the elements are interconnected from the start. This type of interconnection is crucial, according to Vygotsky, as 'the capacity for deduction is only possible within a definite system of relationships among concepts' (Vygotsky, 1987, p. 192). Clearly this has implications for formal education, though working out what these are is not a straightforward task.

The capacity to think abstractly, as Donaldson and her co-investigators understood, is fundamental to the capacity to develop knowledge. However, while they directed attention to the semantic aspect of the experiment, they did not consider its systematic structure as entailing pragmatics. In the redesigned experiment, the reasons or norms constituting the task are explicit in the sense that each element plays a role within a system in a way that is not available in the original mountain task. In Brandom's terms, we could suggest that the inferential demands of the task (owing to the visibility of the inferential structure) are available to the child.

To the extent that children have access to the norms that constitute the task, they are able to decentre or to perspective-take and thus display qualities of abstract reasoning. This is a different way to think of the limitations on understanding – one that does not attribute failure to the limitations of working memory, as is the case for cognitive load theory. If the analogy holds, a learner's capacity is instead primarily dependent on the presence or absence of norms governing meaning, and this is key to any form of pedagogy, whether based on inquiry approaches or on direct and guided instruction.

When Gibb refers to *actual* history and dismisses the impressionist response of the children, he can be understood as demanding that the students learn the academic (scientific) concepts populating the study of history (he would put this in terms of 'Facts') and that these be distinguished from their everyday impressions. He supports[xviii] Kirschner's argument that learners are not in a position to access and retain the relevant information through the use of an inquiry approach because of the cognitive load on working memory and lack of support from appropriate schemas. But what is at stake here is how, assuming the concept is viable in this form, schemas are developed and in what conditions learners are active and able to develop their responsiveness. Instead of drawing on their own impressions, the students, according to Gibb,[xix] need to learn the facts to enable them to absorb further information.

However, where Gibb may see a stark separation between the two types of concepts, Vygotsky saw a close connection, although not one of building on the everyday concepts that a student brings to the classroom. For Vygotsky, the learning of academic concepts transforms everyday concepts and opens new connections for them. Vygotsky's understanding of concepts is quite different from Gibb's. What is relevant here in Vygotsky's account is the significance of systematicity – the idea that in order to possess one concept, it is necessary to possess many.[xx] This emphasis on the relational character of concepts bears close similarity to Brandom's view. Since both have a Hegelian provenance, this is not surprising (Derry, 2008, 2013). Vygotsky argued that '[W]e must seek the psychological

equivalent of the concept not in general representations, . . . we must seek it in a system of judgements in which the concept is disclosed' (Vygotsky, 1998, p. 55).

A Non-Psychological Account and the Importance of Norms

In his philosophy of inferentialism, Brandom brings out the centrality of activity and with it a *non-psychological* account of the conceptual. In broad terms his argument is: rather than concepts being understood primarily in terms of their representational role of naming the phenomena that they stand for, they are understood in terms of their role in a network of inferential relations. Following from this, rather than actions being comprehended in terms of behaviour seen as an outer sign of an inner state, meaning and our capacities to perform particular actions are seen as being actualised in activity. Brandom puts this as follows:

> Psychologism misunderstands the pragmatic significance of semantic contents. It cannot make intelligible the applicability of norms governing the acts that exhibit them. The force of these acts is a prescriptive rather than a descriptive affair. . . To try to analyse the conceptual contents of judgements in terms of habits or dispositions governing sequences of brain states or mentalistically conceived ideas is to settle on the wrong sort of modality, on causal necessitation rather than rational or cognitive right (Brandom, 1994, p. 12).

A non-psychological account of conceptual content, capturing the systematicity of concepts governed by norms and their constitution through human activity, clearly has implications both for pedagogy and for the conception of knowledge in formal educational settings.

The picture of learning in a formal teaching context, conveyed by Kirschner *et al.*, is one in which the conceptual contents that students possess can be understood in terms rather of 'brain states or mentalistically conceived ideas' than of a student's responsiveness to the norms that govern the correctness of concept application. Brandom explains that 'Psychology can study the matter-of-factual *properties* of contentful acts of judging and inferring, but not the semantically determined *properties* that govern them, the norms against which assessments of truth and rationality are to be made' (*ibid.*). This distinction between describing acts and appreciating the norms that play a role in the form that acts take is significant. Without the recognition of another dimension – the idea of norms governing the correct application of concepts – it is not possible to be sure that a student has fully grasped a concept, i.e. that they have grasped its meaning rather than just learnt a word and, more importantly, that they are in a position to apply their knowledge.

The use of the term 'norms' is potentially problematic as it is more commonly understood sociologically as referring to social conventions. However, the term is taken here, in the sense derived from Brandom's reading of Kant, to refer to the means by which we mediate and organise experience. Our ability to actualise our environment and, in so doing, actualise ourselves is present in our capacity to institute norms that we can decide to bind ourselves to. These norms do not describe what we do; rather they function prescriptively in guiding what we *ought* to do, and thus they are open to assent or dissent and to interpretation.

Vygotsky illustrates the role of norms (rules) by referring to an ancient thought experiment, associated with the philosopher Jean Buridan. The experiment was designed to explore the nature of free will. In the thought experiment an ass is unable to choose between two equal and equidistant bales of hay, and thus starves. Vygotsky draws on the experiment to illustrate an aspect of freedom when he refers to one of the characters, Pierre, in Tolstoy's *War and Peace*. Pierre is faced with an impossible choice of enlisting in the army or remaining in Moscow. Vygotsky brings out the distinctive difference between humans and

the ass in relation to free will saying that 'a man who finds himself in a Buridan situation looks for help in artificially introduced auxiliary motives or stimuli. . . [He may] toss a coin and in that way master the situation' (Vygotsky, 1997, p. 46). Tolstoy's tale provides an insight into a key aspect of human intellect for Vygotsky i.e. our ability to mediate our experience by instituting norms: 'man himself creates stimuli that determine his response and uses these stimuli as devices for mastering processes of his own behaviour' (Vygotsky, 1997, p. 49). Humans may exercise freedom in relation to the binding power of nature by attributing significance (for particular reasons and purposes) to external artefacts. Whether it be a coin thrown to make a choice, or a written word to evoke a response, we mediate our experience.

The significance that Vygotsky gives to mediation can also be found in Brandom's inferentialism. For Brandom, 'awareness itself, should be understood, to begin with, in terms of playing a distinctive kind of role in *reasoning*' (Brandom, 2000, p. 1). He takes issue with the 'taken for granted' representationalist paradigm (of awareness understood in representational terms), maintaining that understanding requires reversing the conventional order of explanation, which privileges the representational over the inferential. Our understanding of how meaning arises and is sustained is critical for pedagogy. Peregrin reminds us that although 'we have the peculiar ability to let one thing stand for another', how we establish this relationship is very difficult to explain (Peregrin, 2014, p. 1). How is it that we put in place representations that help us to get a grip on the world we inhabit? Our ability to mediate our activities, and thereby engage in the social articulation of knowledge, can be understood through Brandom's interpretation of the Kantian idea that our freedom is expressed in our ability to bind ourselves (and so be responsive) to norms that we, ourselves, have instituted. We can see this being played out in natural scientific research where we may work with a particular conception, say of a gene, and in so doing understand the world through this particular concept, with certain aspects expressed by the limits of the concept of gene that we employ (e.g. a preformationist or epigenetic conception, Moss, 2003), and others remaining invisible. Our institution of norms (or rules), prescribing how a particular concept[xxi] ought to be deployed, is expressive in the sense that, given the way the world is, certain things will follow and be implied by its deployment.

Crucially by taking into account the particular life-form that is human, Brandom reverses the representationalist approach to meaning. He starts with 'inferential activity [and considers] the making of judgments and the development of concepts entirely in terms of the roles they play' within it (1994, p. 92).[xxii] This more dynamic conception of concepts is thus at odds with thought conceived in terms of individual mental states and words understood as the names for things, events or states of affairs. Giving priority to the inferential over the representational in awareness necessarily forces attention onto the knowledge field, where representations are constituted in the first place. It requires awareness of what governs the correctness or incorrectness of their application, their *normative* character and their articulation. To establish a connection between concept and object, it is necessary to reverse the representational conceptual framework within which much pedagogical practice takes place. It requires adopting an orientation to a knowledge domain where awareness of any one concept is understood as dependent on awareness of its relation to other concepts that constitute its meaning. What follows from this, in terms of implications for how we think about teaching and learning, and in particular how students grasp ideas and make them their own, is that we are unable to rely on 'cognitive load theory' (Kirschner *et al.*), with its attendant concepts of 'information processing' and 'schemata', to adequately explain what is involved in learning. This cognitivist approach, whilst recognising a genuine problem, is unable to do justice to what is distinctively human. The 'bald naturalism'[xxiii] that underpins the account, drawing on concepts that can be applied in the same way throughout the whole

sweep of evolution, fails to recognise the unique character of the human species, which is its life-form. Inferentialism, by contrast, can provide a more powerful explanation of the empirical data that does not deny this distinctiveness of the human life-form.

Privileging the representational over the inferential in teaching is mistaken. The assumption that initial awareness of a concept is grasped first as a representation, and that only later inferences can be made, entails a crucial misunderstanding about the nature of representations, and therefore of concepts. It is an approach that fails to recognise, first, that any meaning attributed to a representation arises from the significance attributed to it in human activity and, second, that human activity involves reasons as well as causes. It therefore neglects the way that the representation functions within a network of inferential connections that constitute meaning. For a machine – e.g. a thermostat that responds to an increase in temperature by switching off – 'action' is merely the outcome of a causal process. For humans, the act of switching off cannot be understood simply in causal terms. The human's response involves (and requires) reasons and awareness of what follows from being hot, i.e. what 'hot' means. Following an inferentialist approach to knowledge, students attend to representations, but through the inferential connections that constitute them. Without the relevant norms being made available to students, the use they make of particular concepts (which demonstrate the particular inferential connections they are *committed* to) will be not be governed by the standards of correctness of the subject domain that they study. The means of ensuring that norms are available to students may be infinitely varied: they may be established by the teacher's questioning and way of responding to student answers, or by design of activities or choice and arrangement of curricular material. But the key point is that the norms cannot be ignored by the teacher or the student.

Responsiveness to norms governing the use of concepts is integral to any dialogue. Each participant in an exchange will have reasons informing the meaning of their utterances. The reference to reasons here does not relate to a more surface level sense of having reasons to support comments and claims, but to an underpinning of the way that concepts function within the exchange. For the meaning of each concept, as it is used in particular expressions, will depend on how it functions within a system of other concepts. Peregrin explains that we should think of the meaning of concepts in expressions in terms of their inferential role, since 'meaning is not a thing stood for by an expression (as representationalists would have it), and nor is it, in fact, a thing at all – it is rather a role the expression assumes vis-à-vis the rules that govern it' (Peregrin, 2013, p. 1092). Each participant in an exchange is responsive to the norms governing their use of particular words. Imagine an exchange about sovereignty between a 'Brexiteer' and 'Remainer' in the UK at the moment. Each will have different conceptions governed by the norms they implicitly take to mark the standards of correct application of the concept. Each will have committed to what follows from the application of the term, and they will attribute to their interlocutor specific *commitments* depending upon how they use the term. Brandom calls this the *game of giving and asking for reasons*. His account gives due recognition to the rational capacities of each person. In his account, grasping the meaning of an utterance involves a distinction between what is said and what is meant, which becomes transparent in the course of the exchange. The crucial point is that each participant is *committed* to specific inferential connections between particular concepts (according to their use in expressions) and that precise meaning only becomes apparent in the course of the exchange. *Commitments* to the particular norms governing each student's specific use of a concept will not be transparent to a teacher unless they have some means for discovering them. This aspect of activity is not automatically present in the design or application of inquiry approaches to learning and in many cases is completely absent.

Brandom's emphasis on the activity involved in communication in terms of the implicit practice of 'giving and asking for reasons' recognises the ongoing assessment of the

specific meaning of concepts, which he terms 'deontic scorekeeping', i.e. the keeping track of commitments and entitlements as the means by which the specific use made of a concept becomes clear. This involves an ongoing process of social articulation resulting from the interlocutors' 'scoring' of each other's *commitment*: what they are each, in fact, committing to in their specific use of a concept and therefore what their related *entitlements* are. By listening to learners' utterances with regard to the responsibility they undertake for particular inferential relations constituting their particular concept use, the distinctively human capacities of learners can be recognised, i.e. that they are responsive to reasons.

This is to say that any utterance made by a student will have reasons in play, even if the utterance may be taken by a teacher as a 'throw-away' comment. The particular inferential relations that students commit to are dependent upon the norms they take to govern their concept use, i.e. the standards of correctness that they assent to. Teachers are aware that their own understanding of concept meaning may differ from the one held by each of their students, and this is coined in the satirical phrase describing poor questioning: 'guess what answer is in my head'. However, despite recognising that each student may attribute a different meaning to a concept, they may not credit reasoning as playing a significant role in the student's usage. What inferentialism offers is a means to diagnose precisely what may be going wrong for the student who uses terms incorrectly, but it does so in a way that fully respects their autonomy as a freely acting human being, who reasons just as the teacher does.

A teacher may approach meaning in terms of a relation between a representation and what it represents by assuming words are names for things, events or states of affairs. Assumptions about meaning will have implications for how they approach pedagogy. A representationalist orientation to meaning and a 'possessive individualist' conception of capacities is presupposed in the following example from a religious education lesson on the Bible. Introducing the Bible in the context of a religious education lesson is a challenging task for a teacher in a comprehensive and diverse classroom. In religious education in England, part of the aim is to foster understanding and appreciation of the practices and beliefs of different faith communities. In the class in question the teacher was aware of the need to motivate students and to gain their interest. In order to do this the teacher attempted to encourage students to take an active role in their learning, and so, rather than teaching didactically about the Bible, the teacher asked the children to 'make their own bible'. The activity was designed to help students think about particular biblical concepts and their meaning, including laws and *prophecy*. The children made a 'fashion bible' in which the concept of law was illustrated by pictures and rules about the age at which particular items of clothing could be worn. The concept of *prophecy* was illustrated by predictions about the likely bankruptcy of clothes shops. Although children enjoyed looking at each other's bibles, this was the only lesson that they had during the year on the Bible. The next lesson moved on to a different aspect of religion. Clearly there is an issue here as to whether the adoption of such an approach fosters any understanding at all of the practices or beliefs of particular faith communities in the context of a religious education lesson.

It is perhaps little wonder that government ministers demand the teaching of facts, along the lines proposed by E.D. Hirsch,[xxiv] and that, when considered in relation to the limitations on working memory identified by cognitive load theory, a dangerous combination arises. Proposals for ways to approach teaching in the light of these limitations include breaking knowledge down into smaller parts and viewing the development of meaning in additive terms. Rather than understanding that learners need access to complex knowledge domains or environments where they have access to the norms governing inferential relations, knowledge is artificially broken up into parts, with the assumption that they can be put back together through teacher modelling of problem-solving. There is limited sense of students' needing to become responsive to reasons themselves, and that this cannot arise

simply through imitation. A word may be clearly connected with its referent, but *how* this connection arises is a matter of pedagogical importance.

Following Brandom, the forging of the connection between word and object involves reversing the conceptual framework of much conventional pedagogical practice and placing the emphasis on bringing the learner into the inferential relations that constitute a concept prior to its acquisition. What it means to bring a learner into the inferential relations constituting concepts is a challenging matter, but without awareness that meaning does not simply reside in a representation and that communication is not a matter of the fidelity[xxv] of transfer of information, learners will not be encouraged to think. In the example of the religious education lesson introducing the Bible, the teacher has an intuition that students are likely to retain and learn what a Bible is if they are in some way 'active'. However, perhaps due to preconceived ideas about individual perspectives in relation to knowledge, the teacher has neglected the central aspect of activity, which is our *freedom*: our ability to assent to certain norms and bind ourselves to them in order to respond appropriately. In the above example, freedom for the teacher is understood as the freedom to choose whatever comes to mind in terms of how the students represent meaning. If it were the case that representations conveyed meaning, the matter might end there. But it is not the case. Meaning is conveyed through inferential relations. The idea of the bankruptcy of particular shops as bearing a relation to the concept of prophecy ignores the inferential connections that constitute the meaning of the word 'prophecy' within its particular knowledge domain. More than this, however, it ignores the nature of the domain in which the learner is developing their responsiveness: their grip on the concepts derived from theology and not from consumer activities. Of course, in an English lesson there may be much to gain by allowing students free rein in how they think about the concepts they are being introduced to, with limited normative constraint. A Dadaist approach may be beneficial in such a context if the purpose is quite different.

What is at issue here is how meaning is understood. Again, meaning for Brandom is the result of inferential roles, and it is seeing concepts in terms of how they function in expressions that offers an account of meaning that is non-psychological in that it does not depend on individual predilections. As Brandom explains: 'Hegel's notion of conceptual content is *not* a *psychological* one. One could mean by that claim that what articulates conceptual content is *normative* relations, a matter of what one *ought* to do, rather than something that can be read immediately off of what one *actually* does or is disposed to do' (Brandom, 2015, p. 130).

If it were a matter of reading off what one does, then the freedom to choose for the students in the Bible lesson could be understood literally through the choices they make to construct their Bible, and reasons governing their choices could be understood in terms of their own character or interests in the 'possessive individualist' sense. This would be trivially a folk-psychological account. But, as Brandom stated earlier, what psychological accounts miss is 'the pragmatic significance of semantic contents'; there is no sense that conceptual contents are governed by anything more than the individual's own beliefs and desires. Norms that have been instituted socially through ongoing articulation in activity are absent from the account. The richer picture of knowledge and learning, in which conceptual contents are actualised and developed in human activity, captures important aspects that are simply concealed in cognitive load theory, and this has significant pedagogical implications for classroom practice. Several authors have attempted to address the pedagogical implications of a richer picture of knowledge and learning by approaching educational practice from an inferentialist perspective. These include Causton (2019), McCrory (2015), Taylor *et al.* (2017) and Marabini and Moretti (2017)[xxvi]. This richer picture is lost in the way that cognitive load theory is currently being interpreted as applying to classroom practice[xxvii].

The issue here is what pedagogic strategies follow from cognitive load theory. The claim is not that normative constraints are always absent in pedagogical practice, but that when they are present they are not the focus of a teacher's attention. To conclude, in one sense Kirschner *et al.* are correct – teachers need to teach the knowledge, the facts; but if they do this in a literal way, solely representationally, without regard to the distinctively human life-form, then they will fail to actualise human capacities of intellect and reason. Even when representations – the facts – are taught 'directly', teachers need to provide the conditions in which learners can be thinkers, i.e. in which they can act rather than remain passive recipients of material to be absorbed but not understood. There are certainly problems with the pedagogy of inquiry learning in some of the ways it is used, in particular because of its potential for the neglect of the normative context in which concepts function and are actualised. It is also in danger of assuming an unreconstructed picture of students whose thoughts are the outcome solely of their own beliefs and desires. The alternative, however, of 'direct or guided instruction' presupposes the same psychological model of individuals possessive of their own capacities, beliefs and desires, and so also fails to convey the knowledge it intends. Both are limited by their lack of recognition of the distinctive life-form that is human being.

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[i]Sen, reporting Sraffa's account, states that Sraffa 'can't remember such a specific occasion' and explains that it 'was more a tale of a moral than an actual event'. Sen reports Sraffa as saying that he 'argued with Wittgenstein so often and so much that [his] fingertips did not need to do much talking' (Sen, 2003, p. 1242).

[ii] Wittgenstein refers to his discussions with Sraffa in the introduction to *Philosophical Investigations*: 'I am indebted to *this* stimulus for the most consequential ideas in this book' (Sen, 2003, p. 1242).

[iii] 'Wittgenstein told a friend (Rush Rhees, another Cambridge philosopher) that the most important thing that Sraffa taught him was an "anthropological way" of seeing philosophical problems' (Sen, 2003, p. 1242).

[iv] 'Some of his basic commitments (his understanding of content in terms of use, his inferential holism, the crucial role he sees the actual history of their application making to the content of concepts) are insights that analytic philosophy has had laboriously to rediscover in this century, due to the efforts of such thinkers as Wittgenstein, Sellars, Quine, and Kuhn' (Brandom interviewed by Carlo Penco, 1999).

[v] Dylan Wiliam, referring to the original work of Sweller that formed the basis of the argument in the Kirschner *at al.* article, tweeted 'I've come to the conclusion Sweller's Cognitive Load Theory is the single most important thing for teachers to know.' Accessed at http://bit.ly/2kouLOq on 18 January 2019.

[vi] '[C]ognitive load theory suggests that the free exploration of a highly complex environment may generate a heavy working memory load that is detrimental to learning. This suggestion is particularly important in the case of novice learners, who lack proper schemas to integrate the new information with their prior knowledge' (Kirschner *et al.*, 2006, p. 80).

[vii] According to Brandom, following Hegel, 'to be conceptually contentful is to stand in relations of material incompatibility ("determinate negation") and material consequence ("mediation") to other such contentful items. I call this a "nonpsychological" conception of the conceptual because it can be detached from consideration of the processes or practices of applying concepts in judgment and intentional action. Objective states of affairs and properties, too, stand to one another in relations of material incompatibility and consequence, and are accordingly intelligible as already in conceptual shape, quite apart from any relations they might stand in to the cognitive and practical activities of knowing and acting subjects. Indeed, if objective states of affairs and properties did not stand to one another in such relations, they would not be intelligible as so much as *determinate*' (Brandom, 2011, p. 2).

[viii] In discussing cognitive science, Brandom maintains that 'we [analytic philosophers] have failed to communicate some of the most basic ideas [about a hierarchy of concepts], failed to

explain their significance, failed to make them available in forms useable by those working in allied disciplines who are also professionally concerned to understand the nature of thought, minds, and reason' (Brandom, 2009, pp. 197-198).

[ix] McDowell sees no reason that rationalism must 'saddle itself with a pinched and shallow conception of reason' (2017, p. 323). 'The remedy,' says McDowell, 'is not to abandon rationalism but to liberalize our conception of reason' (p. 324).

[x] MacPherson attributes the difficulties of modern liberal-democratic theory to 17th century individualism and its possessive quality, where the individual is conceived 'as essentially the proprietor of his own person or capacities, owing nothing to society for them. The individual was seen neither as a moral whole, nor as part of larger social whole, but as an owner of himself. The relation of ownership, having become for more and more men the critically important relation determining their actual freedom and actual prospect of realizing their full potentialities, was read back into the nature of the individual. The individual, it was thought, is free inasmuch as he is proprietor of his person and capacities. The human essence is freedom from dependence on the wills of others, and freedom is a function of possession. Society becomes a lot of free equal individuals related to each other as proprietors of their own capacities and of what they have acquired by their exercise. Society consists of exchange between proprietors' (MacPherson, 1962, p. 3).

[xi] Crucially, Kern rejects the idea that rationality can be understood as possessed by an individual independently of the life-form that characterises that individual. Her argument is that a human life is a categorically distinct form of life that instantiates itself in a distinctive way and cannot be compared, according to the same criteria, to other life-forms. 'According to this Aristotelian line of thought, it is a misunderstanding to think of rationality in its fundamental instance as a capacity of an individual of which one can ask whether and how an individual possesses this capacity, for example, whether it has this capacity "by nature" or whether it is acquired through education without specifying the form of life to which this individual belongs . . . as Michael Thompson has put it, by determining the 'form' of such a form of life. To call a life form rational is thus to say that it is a life form that is instantiated rationally in the life activities of its bearers' (Kern, 2017, p. 5).

[xii] There are also interesting connections here with 'belief-desire psychology' (Strijbos and Bruin, 2012).

[xiii] Fran Abrams (2012). 'Cultural literacy: Michael Gove's school of hard facts', BBC Radio 4's *Analysis* (available at https://www.bbc.co.uk/news/education-20041597, accessed 12 January 2019).

[xiv] Deaney *et al*. (2009) provide an example of a similar activity, but in the case they describe the students had previously been provided with some account of the overall meaning of the picture in question, and this may go some way to providing the normative background necessary for the acquisition of historical knowledge.

[xv] The term 'academic' is perhaps a preferable translation of научные концепции, as the English term 'scientific' can too easily be restricted to the natural sciences. The English word fails to capture the broader meaning of the German word *Wissenschaft*, which applies to any systematic study and thus includes the arts and the humanities.

xvi As such, the place of everyday concepts in any system is not visible to the child; this is to say that despite everyday concepts also forming part of the system (characterised by one concept relating to another systemically), this relation is not 'formalised'; rather it is constituted in the social practices of which the child is not consciously aware.

xvii The inferential relations within a system of concepts can be understood, according to Brandom's reading of Hegel, as deriving from their material incompatibility (their determinate negation).

xviii Kirschner, Sweller and Clark's 2006 paper 'Why Minimal Guidance During Instruction Does Not Work' dispels many of the myths surrounding the belief in 'child-centred' instruction. Despite being popular and intuitively appealing, argue the authors, 'these approaches ignore both the structures that constitute human cognitive architecture and evidence from empirical studies over the past half-century that consistently indicate that minimally guided instruction is less effective and less efficient than instructional approaches that place a strong emphasis on guidance of the student learning process' (https://www.gov.uk/government/speeches/nick-gibb-the-evidence-in-favour-of-teacher-led-instruction, accessed 11 February 2019).

xix https://www.gov.uk/government/speeches/nick-gibb-the-evidence-in-favour-of-teacher-led-instruction.

xx An important aspect of Vygotsky's approach is that scientific concepts are not additively built up from simpler everyday concepts but emerge due to interaction in the whole. The concept of schema derived from Piagetian psychology may not be at odds with this idea if it is understood as external rather than internal.

xxi It should be noted that Brandom takes the sentence as the smallest unit in which a judgement may be made. The reference here to a concept does not preclude this, given that it is used within a specific discourse.

xxii Brandom sees Hegel as completing this 'inversion of the traditional order of semantic explanation' begun by Kant (Brandom, 1994, p. 92).

xxiii McDowell terms reductively naturalistic attempts to 'domesticate conceptual capacities conceived within nature as the realm of law' – 'bald naturalism'. He argues that, '[t]he structure of the space of reasons stubbornly resists being appropriated within a naturalism that conceives nature as the realm of law' (McDowell, 1996, p. 73).

xxiv Hirsch is renowned for stressing the importance of teaching facts (Derry, J., 2017; Yandell, J., 2017).

xxv Drawing from Brandom's inferentialism, Prien explains, 'When we communicate, we do not convey some jointly possessed content. Instead, we map inferential repertoires onto each other and in this sense we cooperate to bring forth the referential dimension of content and objective inferential norms' (Prien, B., 2010, p.456).

xxvi See also the special issue of the *Mathematics Education Research Journal* edited by Arthur Bakker and Stephan Hußmann (2017) entitled 'Inferentialism in Mathematics Education'.

xxvii The literature that teachers have access to – for example a document published by the NSW Department of Education, Centre for Education Statistics and Evaluation, August 2017 (https://www.cese.nsw.gov.au//images/stories/PDF/cognitive-load-theory-VR_AA3.pdf, accessed 27 January 2020) – can be particularly problematic if arguments are summarised in such a way as to provide reductive accounts of meaning. The following extract appears to suggest that the meaning will develop additively built up from 'squiggles': 'Learning to read is a good example of schema construction and automation. Children begin to learn to read by constructing schemas for squiggles on a page – letters. These simple

schemas for letters are used to construct higher order schemas when they are combined into words. The schemas for words, in turn, are combined into higher order schemas for phrases and sentences. This process of ever more complex schema construction eventually allows readers to scan a page filled with squiggles and deduce meaning from it. With extensive practice, readers can derive meaning from print with minimal conscious effort (Sweller, van Merrienboer and Paas, 1998, pp. 255–258). Davis (2013) has explained some of the problems with reductive approaches to reading.