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Mastering as an Inferentialist Alternative to the Acquisition and Participation Metaphors for Learning

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A tension has been identified between the acquisition and participation metaphors for learning, and it is generally agreed that this tension has still not been adequately resolved. In this paper, we offer an alternative to the acquisition and participation metaphors for learning: the metaphor of mastering. Our claim is that the mastering metaphor, as grounded in inferentialism, allows one to treat both the acquisition and participation dimensions of learning as complementary and mutually constitutive. Inferentialism is a semantic theory which explains concept formation in terms of the inferences individuals make in the context of an intersubjective practice of acknowledging, attributing, and challenging one another's commitments. We first introduce the key concepts of inferentialism and consider the perspective on learning that inferentialism inspires. Then, we condense the lessons of the inferentialist concepts into a single mastering metaphor for learning and argue that learning consists in the process by which learners come to master concepts and practices. We conclude by discussing how the mastering metaphor could be put to work in a theoretical reconciliation of the cognitive and sociocultural dimensions of learning.

INTRODUCTION

Anna Sfard (1998, p. 12) proposed that all education research is 'caught between' two metaphors for learning: the acquisition metaphor (AM) and the participation metaphor (PM). These metaphors offer different accounts of the learning process and so lead to theories of learning with contrasting conceptions of what a theory of learning should explain (Salomon and Perkins, 1998). The acquisition metaphor focuses on the learner's 'development', 'internalisation' or 'construction' of knowledge and concepts, and hence can be taken to privilege a conception of learning as coming to 'have' something. In contrast, the participation metaphor focuses on

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the learner's 'membership' of a community and on their capacity for '(inter)action', and hence can be taken to privilege a perspective of learning as coming to 'do' something (Sfard, 1998). Thus, the tension between the acquisition and participation metaphors has been taken to indicate a tension between divergent perspectives on the phenomenon of learning (Mason, 2007).

As Sfard wrote, the central focus of AM is 'the individual mind and what goes "into it"', whilst the central focus of PM is 'the evolving bonds between the individual and others' (Sfard, 1998, p. 6). Thus, 'While AM emphasises the inward movement of the object known as knowledge, PM gives prominence to the aspect of mutuality characteristic of the part-whole relation' between learners and their (social) environments (ibid.). In this way, AM's view of learning places the emphasis on *possession*, where possession is the outcome of the processes of 'construction', 'internalisation' or 'development'. In contrast, PM's view of learning places the emphasis on *interaction*, where interaction is explained in terms of configurational changes that communities or societies undergo as a result of shifts in 'discourse', 'practices' or 'membership'.

To illustrate the distinction between AM and PM, consider learning that $1+1 = 2$. From the perspective of AM, learning that $1+1 = 2$ entails coming to possess some relevant cognitive structures—say, for instance, the concepts of 1 and 2, and some understanding of the syntax of their systematic combination—as the result of some process of development, internalisation or construction involving the individual learners' mind. But from the perspective of PM, learning that $1+1 = 2$ involves coming to be able to do certain things—say, being able to interact in certain kinds of ways with objects, such as wooden blocks, or to participate in social practices, such as counting—as the result of becoming a more central or skilled (inter)actor in a community of practice. Thus, AM conceives of the mechanisms of learning as a coming to 'have' and PM conceives of them as a coming to 'do'.

In this paper, we work from the assumption of an AM-PM antinomy that is grounded in discordant cognitive or sociocultural perspectives on the mechanisms of learning. This assumption is consistent with many points of division and dispute in the literature (Akkerman *et al.*, 2007; diSessa, 2008; Vosniadou, 2007). Our purpose is to make use of *inferentialism* to undermine the AM-PM antinomy prevalent in contemporary educational theory and practice. Inferentialism is a semantic theory developed by the philosopher Robert Brandom that explains concept formation and the establishment of knowledge-claims in terms of the *inferences* individuals make in the context of an intersubjective practice of acknowledging, attributing and challenging one another's commitments. Inferentialism focuses on human reasoning, which it understands as being inseparably both cognitive and social.

Our methodology in this paper is to contribute to education theoretic research by engaging with developments in philosophy and semantics that have a bearing on education (Bransen, 2002; Derry, 2017). More specifically, we apply the lessons of inferentialism to problems in education theory

and research in the vein of, for instance, Bakker and Derry (2011), Derry (2013), Hußmann and Schacht (2015), Noorloos *et al.* (2017) and Schindler and Hußmann (2013).

In the first section of this paper, we examine the theoretical commitments that we take to underpin the antinomy between AM and PM—namely, the cognitive and sociocultural perspectives—and briefly consider the effectiveness of contemporary responses to this antinomy. Then, in the main sections of this paper, we introduce a new framework based on the concepts of inferentialism, and propose that this framework offers a perspective on learning that moves beyond the antinomy between AM and PM by taking learning to be both cognitive and social at the same time. We argue that this *socio-cognitive* image of learning inspired by the inferentialist concepts cannot be captured by the AM and PM metaphors of learning, and so calls for the introduction of an alternative metaphor for learning as grounded in inferentialism. Our alternative, inferentialism-grounded metaphor for learning is the *mastering* metaphor (MM). According to MM, the mechanisms of learning are such that a learner's acquisition of mastery of concepts, knowledge-claims and meaning cannot be distinguished from their mastery of participation in communities of practice. Thus, we present MM as an alternative to existing metaphors for learning that can accommodate both cognitive and sociocultural perspectives on the phenomenon of learning. In the conclusion, we propose that MM allows researchers to move beyond the antinomy between AM and PM and towards a unified theory of learning.

AM AND PM METAPHORS FOR LEARNING

The contemporary debate about which metaphor best describes the phenomenon of learning is marked by disagreement and division. On the one hand, many researchers endorse an acquisition metaphor for learning (AM), which conceives of learning as the process by which a learner comes to possess knowledge about the world (a view summarised in Akkerman *et al.*, 2007; Sfard, 1998). For the most part, AM has been adopted by advocates of cognitive perspectives on learning, who typically characterise learning as the acquisition and/or modification of cognitive mechanisms or conceptual structures within one cognitive system (Cobb, 1994; von Glasersfeld, 1980). AM is effective in helping to explain and describe the changes that occur to individual learners when cognitive or conceptual structures are constructed, modified or replaced (Anderson *et al.*, 2007; Piaget, 1970). Thus, it is frequently assumed that AM's unit of analysis is the individual person—or, perhaps, the individual mind—and that AM studies this unit of analysis from a cognitive perspective as a system able to possess concepts, knowledge and meaning in virtue of being governed by rules of a symbolic or conventional nature.

On the other hand, many other researchers endorse a participation metaphor for learning (PM), which presents learning as the process of becoming a more central or skilled participant in a community (Akkerman *et al.*, 2007; Lerman, 2001; Mason, 2007; Roth, 2015). Because of its

emphasis on participation, for the most part PM has been adopted by advocates of the sociocultural tradition, who typically characterise learning in terms of an interaction between history, culture, society and groups of individuals. And PM has also been utilised in situated or distributed accounts of the nature of cognition and activity (Greeno, 1998; Luria, 1976; Vygotsky, 1978). PM is effective in helping to explain and describe the changes that occur to individual learners when communities and situations are entered into, modified or disbanded (Anderson *et al.*, 2007). Thus, it is ordinarily assumed that PM's unit of analysis is the social collective, in the form of interactive configurations of communities of practice within culturally and historically embedded societies (Cobb and Bowers, 1999; Cobb and Yackel, 1996).

An AM perspective, then, typically conceives of the individual learner as an autonomous cognitive system who cultivates a personal understanding of the world by constructing, receiving or otherwise developing cognitive structures within their own mind. The social, on this AM perspective, is merely the context that cognitive systems respond to and are affected by in the process of acting in accordance with their prior constructed, internalised or developed cognitive structures (Noorloos *et al.*, 2017). A PM perspective, however, typically conceives of the learner as a participant in—and on some views a product of—the social, which is defined in terms of possibilities of (inter)action; for example, as a domain of potential discourse or practice (Valsiner and van der Veer, 2000). Learning, on this PM view, is conceived of as the result of the participatory interactions that individual learners have with other individual learners, materials and representational systems within organised sociocultural structures. As Akkerman *et al.* (2007) point out, this implies that the distinction between AM and PM is first and foremost about where learning takes place, with AM understanding learning as being within the individual cognitive system and PM understanding learning as being within the social.

The tension between AM and PM has been the cause of important debates in psychology and educational theory (*cf.* Anderson *et al.*, 1996, 1997; Cobb and Bowers, 1999; Confrey, 1995; Glick, 2004; Greeno, 1998). And the fact that empirical data seem unable to settle the issue in favour of either AM or PM has inhibited progress (Van den Bossche *et al.*, 2006). Sfard (1998, p. 10) herself has suggested that we must abandon the search for a global, unifying metaphor for learning altogether, because 'Each has something to offer that the other cannot provide'. And she states that '[t]he relative advantages of each of the two metaphors make it difficult to give up either of them'. Whilst we accept that finding a global, unifying metaphor for learning will not be easy, we are not ready to give up on the idea that the benefits of both metaphors can be accommodated in one metaphorical framework; and we are not alone (Vosniadou, 2007). In particular, we agree with diSessa's (2008, pp. 427–428) claim that the 'split' between cognitive and sociocultural perspectives—and hence AM and PM—has led to a dichotomised, marginalised and sectarian state of affairs, which is not conducive to bridging the two points of view.

Many researchers therefore agree that the tension between AM and PM metaphors is undesirable, but it remains unclear how it is to be overcome (Mason, 2007). In order to make some progress, perspectives have been developed which purport to shift attention away from the gap between cognitive and sociocultural approaches to theorising (Billett, 1996; Smith, 1995); to move beyond the individual-social antimony in discussions of Piaget and Vygotsky (Cole and Wertsch, 1996; Hatano, 1993; Kitchener, 1999); or to open up new avenues of discourse by connecting, merging or bridging cognitive and sociocultural perspectives (Mason, 2007; Radford, 2008; Vosniadou, 2007). Underlying these related trends is a general dissatisfaction with a 'dualism' that has been identified between the cognitive and the social (Hua Liu and Matthews, 2005). These reactions signify the emergence of a growing concern about the antinomy between AM and PM. This concern is predicated on the idea that both the cognitive and sociocultural dimensions should be accommodated in any viable theory of learning (diSessa *et al.*, 2015; Mason, 2007).

The problem, however, is that there is currently no consensus about how AM and PM can be harmonised within one metaphorical framework (Salomon and Perkins, 1998). Let us mention just two attempts at metaphorical harmonisation here. One example of an attempt to harmonise AM and PM could be Rogoff's *apprenticeship* metaphorical framework for learning, which asserts that 'individual effort and sociocultural activity are mutually embedded, as are the forest and the trees', such that we should 'recognize the essential and inseparable roles of societal heritage, social engagement, and individual efforts' (Rogoff, 1990, p. 25). Another attempt could be the *knowledge-creation* metaphorical framework for learning, which asserts that learning is the systematic development of objects or artefacts that are put to use by learners in various socially embedded skills and practices (Paavola and Hakkarainen, 2005).

Although we think that both these metaphorical frameworks are valuable, one still continues to find positions that take strong stands on either side of the AM-PM antinomy. For example, Demetriou and Bakracevic (2009) and Roth (2015) prioritise AM and PM respectively in the domains of developmental psychology and education theory. We believe, therefore, that there is a need for the introduction of a new metaphorical framework that attempts an even more explicit and perspicuous reconciliation of the cognitive and social aspects of learning. Even though we find the apprenticeship and knowledge-creation frameworks valuable, we do think that our engagement with previously unconsidered philosophical advancements ensures that our framework brings with it a novel perspective on—and solution to—the problem at hand. Our task in the remainder of this paper is to articulate the perspective and solution brought out by this new framework by reference to developments in philosophy that have already begun to move beyond the cognitive-sociocultural antinomy, in particular inferentialism (Brandom, 1994). Accordingly, in the next part of this paper we introduce some central concepts of inferentialism, before introducing the metaphor of *mastering* (MM) that is grounded in the perspective on learning that inferentialism inspires.

AN INTRODUCTION TO INFERENTIALIST CONCEPTS

AM emphasises the cognitive aspects of learning. PM emphasises the social and cultural aspects of learning. By contrast, the concepts of inferentialism may be considered to characterise learning as a matter of *socio-cognitively acquiring and participating*. In this section, we discuss three central concepts that inferentialism offers—the *game of giving and asking for reasons*, *scorekeeping* and the *space of reasons*—and then briefly outline the image of learning these concepts inspire.

In the past a focus on the social or participatory aspect of learning has often been at the expense of a focus on learning's cognitive or reason-involving aspect, and vice versa (Guile and Young, 2003). But inferentialism teaches us that there is no reason why the one should come at the expense of the other, given that it is possible to think of a participatory practice of reason-giving. One of inferentialism's key concepts—the *game of giving and asking for reasons* (Brandom, 1994, Chapter 3)—describes a participatory practice which consists of the intersubjective making, disputing and ratifying of claims. This game characteristically involves the participatory interaction between at least two speakers, where every time one speaker makes a claim, it is up to the other to assess whether or not that claim is warranted. Does the speaker have evidence for the claim? Does it follow from other things he or she has said? Does it not contradict them? If so, the claim is acceptable according to the norms embedded within the game, and in this case the individual making the claim acquires justification for that claim. If not, the speaker will not acquire justification for the claim, which will have negative consequences: for example, in extreme cases, he or she may become known as someone who is mistaken, ignorant, or even a liar.

The discursive activity of keeping track of one's own and others' assertions, commitments, and entitlements is captured by another inferentialist concept: *scorekeeping*. The concept of scorekeeping entails that speakers mutually assess each other for the rationality and truth of their commitments whilst striving for the acquisition of justification for their own claims. That is, they keep track of what they and their interlocutors have asserted and evaluate how, and whether, each commitment entailed by an assertion follows from the other assertions that have been made. These assertions need not be overtly articulated, because one may keep track of one's own private assertions and commitments internally. However, cases such as this would count as internalisations of the socially established normative practice of evaluating whether or not a person is entitled to the commitments that accompany their assertions. This dynamic of evaluating commitments that coincide with assertions is characteristic of the game of giving and asking for reasons, and is the ongoing condition through which concept formation, knowledge acquisition and communication are possible. In this sense, cognitive activity is of the utmost importance to the game of giving and asking for reasons. At the same time, this cognitive activity is not confined to the possessions of any given individual's head. For inferentialism understands the cognitive activity of reason-giving in terms of moves permitted—that is, *allowed* or *disallowed*—in the language game: it is the underlying level

of *norms* that explains them, as captured by the concept of scorekeeping. For example, if I contradict myself by making two incompatible claims, this is to be explained as an unwarranted move in the game. The *rules* that institute norms are ultimately due to the mutual assessments of participants in the game. So there is yet another sense in which interactive participation in the game, i.e. mutual activity, coincides with the cognitive notions that are built up and come to be possessed in the course of the game itself.

We propose that the game of giving and asking for reasons is the inferentialist concept most pertinent for an account of learning *activity*; that is, for the dynamics of learning. But inferentialism also has a complementary concept that is pertinent for an account of the *content* of what is taught. This supplementary concept is that of the *space of reasons*. Brandom's inspiration Wilfrid Sellars wrote that:

> '[I]n characterizing an episode or a state as that of *knowing*, we are not giving an empirical description of that episode or state; we are placing it in the logical space of reasons, of justifying and being able to justify what one says' (Sellars, 1997, §36; original italics).

The space of reasons is instituted by the (inter)activity of participants in the game of giving and asking for reasons, and is opposed to the 'realm of law' wherein one finds only causal and potentially deterministic relations (McDowell, 1994). In other words, the space of reasons is the space in which (rational) commitments are made and are justified as following from previously established commitments. In participating in the game and trying out different claims and the reasons for them, this space is explored and—at least partly—mapped out. Humans are inducted into this space in the course of both their cognitive and social development. An inferentialist perspective on the content of learning, therefore, characterises learning dynamics in terms of the *navigation* of an established part of the space of reasons or the *exploration* of a new area within the space of reasons. It is worth emphasising that in this way any talk of the possession of concepts must on the inferentialist view be equated to the ability to use them and to reason with them; that is, to make inferences with these concepts.

To speak of the navigation or exploration of a space of reasons is one way to describe the activity of the learner on an inferentialist picture. This is a description given at the level of content. But as we mentioned above, a complementary description given at the level of intersubjective practice is also possible, where to count as knowing a concept is to be able to use it in the game of giving and asking for reasons. Here Brandom speaks of the *know-how* and *practical mastery* of conceptual reasoning and hence inference-making. He writes:

> 'To grasp or understand [. . .] a concept is to have practical mastery over the inferences it is involved in—to know, in the practical sense of being able to distinguish (a kind of know-*how*), what follows from the applicability of a concept, and what it follows from' (Brandom, 2000, p. 48, original italics).

So someone who is able to navigate the space of reasons has *acquired* practical mastery over the inferences—and hence concepts—involved in that (part of the) space. And this just is a matter of being able to *participate* in the game of giving and asking for reasons—namely, of acting according to the scorekeeping norms for making justified inferences and using the correct concepts.

In this way, the inferentialist concepts paint a picture of learning in which social participation and cognitive activity are fully integrated: the game is essentially one in which individuals possess the capacities to make *inferences*, give *reasons* and use *concepts*, but to play the game entails that one has partners with whom to engage in the participatory, discursive *practice* of scorekeeping. These two sides of the game do not exclude each other. Nor can one side be reduced to the other: it is not possible to participate without engaging in acquisitive cognitive activity, nor to engage in acquisitive cognitive activity without participating. (Solitary thinking, according to Brandom, must be explained in terms of an internalisation of the game of giving and asking for reasons—a view commensurable with Sfard's (2008) idea of thinking as communicating.) So neither social interaction nor cognitive possession can be privileged in inferentialism. Instead, inferentialism brings with it a perspective in which we must view learning as the process in which learners *socio-cognitively acquire and participate* at one and the same time.

One important point to note here is that the inferentialist *concepts* we introduce are themselves metaphorical in the sense that they are conceptual tools that help us to think of one thing in terms of another (Lakoff and Johnson, 2003). As a result, such concepts should not be taken literally. For example, inferentialism makes use of the concept of *playing a game* to highlight the importance of participatory activity for socio-cognition. But it would be inappropriate to interpret this concept literally by comparison to cases of, for instance, playing football or Monopoly. Rather, this concept is meant only to illustrate the inferentialist idea that all cognitive activity must proceed according to socially established and evaluable norms; so that one can just as well 'play' alone, but to count as 'playing' at all one must be adhering to the rules of the social 'game'. This kind of non-literality is common to the concepts associated with AM and PM too. AM, for example, makes use of the notion of *possessing* knowledge-claims or concepts, but does not tell us what kinds of things knowledge-claims or concepts are such that they can be possessed. Consequently, it would be a mistake to take this concept of 'possession' literally and compare it with, for instance, the possession a piece of private property, such as a car. And PM too makes use of the concept of *interaction* between individuals and (social) environments, but offers no account of how environments could have the motives, intentions or desires that stimulate and guide action. So, again, to take the PM concept of (inter)acting environments literally as a conscious willing, doing or performing on the part of an aggregate of things, conditions or influences would be infelicitous. Thus, in a similar vein to how AM and PM make non-literal use of the concepts of possession and interaction to underpin their metaphorical frameworks, we will make

non-literal use of the inferentialist concepts to underpin our metaphorical framework of mastering (MM).

THE MASTERING METAPHOR

We have claimed that the perspective on learning that inferentialism inspires—as comprised by the inferentialist concepts the *game of giving and asking for reasons*, *scorekeeping*, and the *space of reasons*—is one according to which learners *socio-cognitively acquire and participate* at one and the same time. We now condense the lessons of inferentialism into one metaphor that we think is equipped to capture the account of socio-cognitive acquisition and participation that inferentialism describes: *mastering*.[1] Moreover, we explain how the mastering metaphor (MM)—as grounded in inferentialism—has the potential to move beyond the antinomy between AM and PM, and to be perhaps the first genuinely socio-cognitive metaphor for learning.

Mastery as a term means to have great skillfulness with respect to, or knowledge of, some subject or activity. When exhibiting mastery an individual is exhibiting his/her individual expertise and proficiency. But mastery is also a graded concept: some individuals will be more masterful than others when it comes to their skill or knowledge of one particular subject or activity. Crucially, however, the only way that one can be judged to be masterful (or more masterful) is by comparison with others. This is the case because mastery is a normative concept and can only be ratified in a social practice or community: a self-proclamation of mastery admits of no ratification and so is as meaningless as declaring oneself to be, say, beautiful. Brandom (2009, pp. 70–71) makes an identical point when he argues in regard to 'the status of being a good chess player' that:

> 'Achieving the status of being a good chess player is not something I can do simply by coming subjectively to adopt a certain attitude toward myself. It is, in a certain sense, up to me whom I regard as good chess players: whether I count any wood pusher who can play a legal game, only formidable club players, masters, or grand masters. That is, it is up to me whom I recognize as good chess players, in the sense in which I aspire to be one. But it is not then in the same sense up to me whether I qualify as one of them. To earn their recognition in turn, I must be able to play up to their standards. To *be,* say, a formidable club player, I must be recognized as such by those I recognize as such. [. . .] My recognitive attitudes can define a virtual community, but only the reciprocal recognition by those I recognize can make me actually a member of it'.

Thus, the individual expertise and proficiencies that a masterful individual must possess are always intersubjectively evaluated. It is for this reason that one often thinks of a master taking an apprentice—someone who is not yet masterful—in order to train them to the masterly standard of the guild (Lave, 1988). The term 'mastering', then, has both individual-possession and social-interaction aspects.

The inferentialist concepts we introduced above shed light on an inferentialist perspective that values both cognitive and social attributes equally. But one may be inclined to argue that we have placed too great an emphasis on learning as a dynamic activity without considering the developmental content that must accrue with learning. For instance, the inferentialist concepts appeal to the *giving* of reasons, the *making* of inferences, the *navigating* and *exploring* of the space of reasons, and the *knowing-how* to apply a concept. We propose that this gerund-based nature of the inferentialist concepts is well suited to capturing the dynamical nature of learning activity; that is, the fact that learning is a socio-cognitive *process* of some kind. However, when it comes to formulating an explanation of the mechanisms of learning it is also essential that an account is given of the result of learning activity.

Taken alone, none of the gerunds listed above are able to capture one important feature of the process of learning: improvement. Inferentialism, however, is able to account for this feature of learning, because learners can be said to *perfect* their capacities to give reasons, make inferences, navigate and explore the space of reasons, and know how to apply concepts. Inferentialism, therefore, is equipped to emphasise the *developmental content* of learning, but the gerund-based presentation of the inferentialist concepts could be criticised for not emphasising the developmental nature of the process of learning enough.

A metaphor that is able to capture the picture of learning that inferentialism inspires must, therefore, satisfy two desiderata: (i) it must accommodate the inferentialist account of the dynamic, participatory activity of learning (as exemplified by the *giving* of reasons and the *making* of inferences); and (ii) it must account for the developmental content and capacities a learner acquires as s/he learns (as exemplified by a learners' increased capabilities to *navigate* and *explore* the space of reasons and to *know how* to apply concepts). What's more, it must satisfy these two desiderata and also be interpretable in terms of inferentialism's picture of learners' *socio-cognitively acquiring and participating* at one and the same time. Here, we think that Brandom himself provides the basis of an answer in his metaphor of *practical mastery*—that is, in his idea that the mark of a capable concept user is the practical mastery that person displays in his or her use of the concept.

We have said already that the inferentialist concepts adequately capture the fact that learning is a dynamic process. What MM adds to the image of learning captured by the inferentialist concepts, however, is the notion that learning involves a getting better—an improvement—on the part of the learner. In this sense, MM illustrates that according to inferentialism one may become better at making inferences as one becomes better at navigating the space of reasons, and hence that one may become a more competent participant in the game of giving and asking for reasons as one becomes a more accomplished scorekeeper. Thus, according to MM, one may come to possess greater (practical) mastery at engaging in the dynamics of learning, as spelled out in terms of the inferentialist concepts.

As a metaphor grounded in inferentialism, then, MM augments the inferentialist account of learning as a dynamic, participatory activity by

incorporating an account of developmental content; a feature that is often lacking in philosophical discussions of learning (Bakhurst, 2011). As a consequence, MM provides a picture of learning as a developmental process undertaken as learners improve their capacities to give reasons, make inferences, navigate and explore the space of reasons, keep score, and thus know how to apply concepts. MM, therefore, satisfies desiderata (i) and (ii) because it highlights that it is only in the socio-cognitive context of the game of giving and asking for reasons, scorekeeping, and the space of reasons that mastering occurs.

MM perfectly attaches to the inferentialist concepts because both 'mastering', as an ordinary language term, and inferentialism contain complementary individual-cognitive and social aspects. To drive this point home, it is worthwhile briefly comparing MM with both AM and PM.

Consider AM to begin with. MM is able to accommodate acquisition in its image of learning, because mastery is something that can be acquired and so possessed. For the inferentialist, acquiring mastery means to improve one's capacities to give reasons, make inferences, navigate and explore the space of reasons, keep score, and thus know how to apply concepts in the game of giving and asking for reasons. Acquiring mastery, therefore, is an inherently socio-cognitive process when viewed from the perspective of the inferentialist concepts, and hence from MM as grounded in inferentialism. Thus, while MM captures a picture of learning in which individual learners acquire mastery, this acquisition of mastery is always already bound to the socio-cognitive nature of human reasoning, conceived of as a practical activity.

Now consider PM. MM is also able to accommodate participation in its image of learning, because according to the inferentialist concepts mastering is only possible in—or against the backdrop of—social interaction. The process of mastering is a dynamic activity that is underpinned by participatory interaction between the players of the game of giving and asking for reasons, each keeping score of themselves and one another, while occupying their communal space of reasons. What is more, according to MM, learners can become increasingly masterful participants, insofar as they can become more skilled in giving reasons for what they do or responding to the reasons given by others. This sociocultural dimension of learning cannot be separated from the cognitive dimension of individual learners who possess the mastery to play the game, make inferences, give reasons, and use concepts.

To understand how MM is able to accommodate AM and PM without prioritising one or the other it is important to see that for MM—as grounded in inferentialism—such prioritisation is simply not possible. For MM, both the acquisition and participation dimensions of learning are interwoven from the beginning and cannot be separated. To make this point clear it may help to compare the commitments of MM with the commitments of AM and PM (see Table 1). The important point to draw out here is that it is inevitable that with MM all talk of the individual-cognitive dimension of learning must lead back to the sociocultural dimension of learning, and vice versa. Any description of individual reasoning is predicated on an understanding of the social norms that reasoning is subject to, just as any description of

Table 1. Comparison of AM, PM and MM Metaphors for Learning (the first three columns are based on Akkerman *et al.*, 2007)

Distinctive conceptual/ metaphorical dimensions	Acquisition (AM)	Participation (PM)	Mastering (grounded in inferentialism) (MM)
The individual	Individual as autonomous possessor; promotes possession-possessor relationship	Individual as participant in social practices as a mutual (inter)actor; promotes whole-part relationship	Individual as member of game of giving and asking for reasons; individual-possession and social-interaction develop in tandem within the game
The social world	Contexts of performance	Evolving systems of socially organised discourse and activity	Socio-cognitively structured setting or context of human reason in which individual mastery is possible and evaluable
Individual-social	Individual possession and action can be understood independently of social structures or interactions	All individual possession and activity must be understood as involving socially organised activity	No cognitive possession without social participation (or interaction), no social participation (or interaction) without cognitive possession. Mastering applies to both individual and social aspects of learning
Cognition	Those structures consisting of conceptual and procedural knowledge that have been individually constructed, developed, or received	That which is disposed to agree with certain propositions as the result of being culturally shaped and patterned by social and cultural circumstances	The capacity to operate according to the rationally evaluable norms of the socio-cognitively constituted language game
Learner	Possessor; (re-) constructor, developer, or receiver	Peripheral interactive participant, part of part-whole relationship	One who is mastering a subject matter or practice
Learning	Entails gaining possession over some commodity	Entails becoming a valuable participant in social practices through interaction	Entails acquisition of mastery over socio-cognitive capacities, as ratified in (linguistic) practice
Knowledge	Is considered a structure in the person's mind, and as such a possession of the knower	Is considered as the ability to (inter)actively participate, e.g. in discourse or practice	Is considered as the socially evaluated normative status of having mastered some concept or practice, as shown by being able to rationally engage with it

social interaction must be based on an appreciation of the rational relations between moves in the social game.

CONCLUSION

Sfard (1998, p. 12) argued that we 'are doomed' as researchers to live in 'a reality constructed from a variety of metaphors'. According to Sfard, '[w]e have to accept that the metaphors we use while theorising may be good enough to fit small areas, but none of them will suffice to cover the entire field' (ibid.). Sfard made this claim because she did not see a way to overcome the antinomy between AM and PM. And this led her to argue that we should abandon our hopes of finding 'a unified, homogeneous theory of learning' (ibid.). We certainly agree that overcoming the tension between AM and PM once and for all will not be easy. But we do not feel ready to give up the ghost just yet, and we propose that both AM and PM are unified from the start from the perspective of MM as grounded in inferentialism.

Sfard herself argued that the 'act of acquisition is often tantamount to the act of becoming a participant, and if so, one can find it difficult to consider AM and PM separately, let alone as mutually exclusive' (ibid., p. 6). Moreover, she suggested that an 'adequate combination of the acquisition and participation metaphors would bring to the fore the advantages of each of them, while keeping their respective drawbacks at bay' (ibid., p. 11). Ongoing debates within the literature can be viewed as attempts, whether explicitly or implicitly formulated, to arrive at such an 'adequate combination' of AM and PM in the domain of theory. For examples, see the debates concerning Lave and Wenger's theory of legitimate peripheral participation (1991) or developments in activity theory (Engeström, 1987). MM, we submit, represents a novel and more explicit attempt to formulate a combined metaphorical perspective, one that we believe is viable given its grounding in the inferentialist concepts which prioritise neither the cognitive nor the social, but take both to be mutually complementary.

The inferentialist perspective represents a novel approach to the discussion of metaphors for learning, because the tension between AM and PM is not so much overcome as *dissolved* altogether. The reason for this is that MM enacts no unification of AM and PM from above—that is, MM is not predicated on the idea that AM and PM capture distinct perspectives to be reconciled. Instead, MM proceeds from the idea that AM and PM are two perspectives on one thing—human reasoning (including rationality in action)—and it is a mistake to think otherwise. Thus, MM argues from below that individual cognition and sociocultural participation are always already unified, not only from the start of the explanatory framework, but also throughout the development of human life.

While we do not expect to be able to articulate a unified, homogeneous *theory* of learning here, we would hope that our introduction of MM as an inferentialist metaphor for learning at least opens up this possibility once again. Many researchers have now noted that the antinomy between AM and PM has arrived at a deadlock, but we believe that the perspective of MM can help us to overcome this deadlock. This perspective is itself

consistent with an emerging trend to engage with inferentialism in the context of education and development (Bakker and Derry, 2011; Derry, 2013; Hußmann and Schacht, 2015; Noorloos *et al.*, 2017). What is more, it promises to provide the basis upon which researchers, working in harmony as opposed to division, can develop new theories and empirical methods that will move the debate about the nature of learning forward. Our hope, therefore, is that researchers sympathetic to this perspective can benefit from MM as a metaphor for learning when they come to formulate future theories of learning that are both fundamentally cognitive and fundamentally social at one and the same time.[2]

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NOTES

1. Although our mastering metaphor (MM) may be continuous with Bloom's models of learning *for* mastery in which the *aim* of learning is mastery, our ambition in this paper is to endorse a different claim: that, from a metaphorical perspective, learning *consists* in the process by which people master concepts and practices (Bloom, 1968, 1971). For this reason, whilst empirical studies that have tested Bloom's model within education practices (e.g. Guskey and Pigott, 1988; Kulik, Kulik, and Bangert-Drowns, 1990*)* provide strong evidence of the interconnection between mastery and learning, it also must be recognised that the primary aim of these studies has been to show that mastery is—or at least should be—the *result* of learning. In our account of MM, mastering as a gerund/verb (e.g. coming to master) is a metaphor that takes learning to *be* both a coming to more expertly know/have and a coming to more expertly do at the same time.
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