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Dinosaur Discourses: Taking stock of gendered learning myths

Abstract:

The persistence of gendered learning myths in educational contexts and the wider imaginary continues to trouble feminist educational researchers and practitioners. The tracing of such myths and the categories they create through authoritative and elite discourses of the past suggests how they have functioned across different fields to preserve a hierarchised binary. Gendered myths seem to be lent authority by some of the more popular claims of contemporary neuroscience as they were by the nascent Victorian psychological sciences. Adopting Michele Le Doeuff's (2003) heuristic of identifying which attributes are absorbed into masculine intellectual legacies and which 'cast off' to women allows for a focus on patterns of privileging of learning discourses across the humanities and sciences, and the ways these are constituted in historical and contemporary contexts.

Key words: gender; learning; elite; genealogy; feminist; Le Doeuff

Introduction

Some discourses 'tend to lumber on through time, being activated in circumstances where their use is anachronistic'; it is only when such anachronisms come into conflict with new discursive regimes that their underpinning 'logic' becomes foregrounded as a

construct, not a truth (Mills 1995). This paper is concerned with some historical 'truths' which persist, not always as dinosaurs lumbering around in anachronistic and highly noticeable ways, but as more pervasively entwined into the discursive DNA of gender and learning.

This will entail a genealogical 'taking stock' in a Foucauldian sense, an examination of the ways in which knowledge about gender and learning has come to have authority (Foucault 1969; 1970). This enquiry grew from an interest in the origins of the contemporary successful girl discourses, in the spaces and institutions where gendered learning knowledge is produced, and in the operations of masculine privilege within them. In 'taking stock' in this way I aim to provide some further historical context for work which examines gendered learning discourses in schools and the wider imaginary, and to extend critical consideration of ways in which Western, rational, models of knowing persist in gendered (and other) inequalities. In doing so I draw on philosophical and scientific thinking which both pre-dates and informs contemporary educational provision, and argue that its categories and exclusions can be seen to operate in the same discursive ways in contemporary contexts and in particular in 'new' scientific claims

Knowledge, science, myth and the imaginary: Michel Foucault and Michèle Le Doeuff

Foucault describes the purpose of genealogies as being to create a history of the present (1979, 30), and to oppose unitary discourses and 'the scientific hierarchisation of knowledge and its intrinsic power effects' (2003, 10). In undertaking such an operation with regard to essentialising nature of gendered learning myths Le Doeuff (2003, 11) observes we are challenging the understanding of 'woman' as a stable and knowable

object by turning our attention instead to the variable values and categories ascribed to gender. To understand the power relations inherent in such categorisation we need to examine not merely the contents of the categories, but the boundaries which contain and frame them in such a way as to make them intelligible within the wider discourse (Foucault 1970). It is not then the empirical existence and properties of gendered learning patterns that are of interest, so much as the questions of how such classifications as girls' and boys' learning preferences come to exist, what kinds of object become intelligible through them, and into what broader system of knowledge/power they fit.

Le Doeuff is particularly concerned with the exclusion of women from philosophical and scientific endeavour, the privileging of masculinity as rational, and the 'casting-off' to women of less valued intellectual attributes. She aims to uncover 'some aspects of a framework common to certain forms of institutionalised knowledge and everyday life', and recognises that this necessitates working with history to help 'to decipher the present'. This she declares:

> demands scrutiny of the myths and images that regulate the relationships between the intellect and sex, between the sexes and the order of knowledges. Myths broadly diffused ensure the persistence of the sex question in the collective epistemic imaginary. They also show the link between social beliefs and beliefs current in institutions of learning (2003, xv)

Her work has a particular relevance for education in its insistence on the relationship between institutional and social knowledge, and her determination to challenge its gendered shibboleths. Whereas Battersby (1988) exposes the exclusionary and misogynist nature of the philosophical canon, Le Doeuff moves beyond texts to look at practices and institutions, drawing on popular examples and her own experience.

Le Doeuff claims that 'there is no intellectual activity that is not grounded in an imaginary' (2003, xvi). 'Imaginary' here refers to shared, largely unexamined system of beliefs that shape our social world (Steger & James 2013, 23). However, this is not to say that the imaginary necessarily exists in tension with endorsed knowledge or scientific 'truths'—indeed these are key to its being. As Foucault observes:

> The imaginary is not formed in opposition to reality as its denial or compensation; it grows among signs, from book to book, in the interstice of repetitions and commentaries; it is born and takes shape in the interval between books. It is the phenomena of the library (1964, 91)

Foucault (1977) conceives of an imaginary as formed in libraries, in reading, in texts, in repetition. Developing an historical sensibility to gendered learning myths involves tracing not only their claims but their patterns and repetitions across different texts and contexts that derive authority from elite and scientific fields.

The enduring patterns Le Doeuff traces in the past can be identified in the present. Important among these is a process of categorisation that she terms 'casting off'. She describes it as a process by which:

> everything that acquires value is absorbed into the heritage of those to whom the value is attributed, whereas everything that has low value is off-loaded onto those whose lot in life is to accept other people's hand-me-downs (2003, 32)

In applying this simple heuristic of what is appropriated and what 'cast-off' Le Doeuff illuminates the historical masculinisation of rationality as male privilege and draws attention to the essentialising and subjugating tendencies in equal-but-different discourses of intellectual complementarity.

Elite discourses and educational genealogies

My interest in the history of the gendering of intellect developed through tracing the genealogy of the contemporary successful girl. Discourses of learning, academic ability, and intelligence as they are now understood are difficult to pursue prior to the growth of universal education in the newly industrialised West. Before this it is in elite discourses—elite in the sense of concerning privileged, educated groups, as well as in the sense of pertaining to the highest orders of attainment and performance in artistic, philosophical and scientific fields—that we find ideas about potential, capacity and aptitudes.

Discourses of genius provide particularly rich ground for examining the historical operations of privilege with regard to gender, knowledge and power. They are important to examine not only as sources of cultural authority in the past, but as providing insight into gendering of what we now term 'abilities' in the present. They also have particular relevance in the context of the growing body of work on academic elites and high achievers in schools (e.g. Renold 2001; Renold and Allan 2006, Ringrose 2007; Allan 2010; Frances, Skelton and Reid 2010; Skelton and Francis, 2012; Jackson and Nyström 2015).

'Genius' is always explained according to the mythologies of a given age (Kivy 2001) and, as observed by Duchin (2004, 1), it 'has a politics, and in particular a sexual politics'. Exploring how categories of genius have worked historically to preserve masculine privilege and to contain and subjugate feminine achievement enables recognition of ways in which the same categorisations and exclusions continue to operate in gendered learning myths. Three broad types of genius emerge within the overarching elite discourse. These have dimensions that can provide us with a template for understanding the gendering of achievement and the elision of other forms of

structural disadvantage in contemporary contexts. The categories are those of innate ability, of achievement through diligence, and finally of collaborative attainment.

The innate genius and the brilliant boy

The dominance of the figure of the brilliant boy who achieves apparently effortlessly, and the greater value placed on such learning behaviour in classrooms, has been well documented (Cohen 1998; Benjamin et al, 2003; Francis and Skelton 2005; Epstein, Mendick and Moreau 2010; Francis, Skelton and Reid, 2010 Stables et al. 2014). Jackson and Nyström (2015) comment on the paradox of schools inciting students to work hard, yet lauding most highly those who seem to achieve with least effort.

Such an idea of natural brilliance has exercised a powerful hold over the Western imagination, both within educational settings and wider public discourse. A model of innate gifts with which individuals are randomly bestowed allows for differential educational treatment, because one is merely realising what is already there rather than creating the conditions for success. It also presents a determinist view in which biological accident replaces other forms of random privilege. Thus it appeals to the conservative, 'common-sense' view of educational provision and lends a gloss of fairness to the unequal distribution of advantage. Jackson and Nyström (2015) argue that its role in upholding certain kinds of privilege is precisely what enables the 'effortless achievement' model to perpetuate. It also maintains a focus on identifying, measuring and nurturing the individual rather than examining the structural reproduction of advantage (Dyson *et al*. 2010). While this works to explain something of its persistence in education practice and policy, the function of innate genius discourses within wider patriarchal culture also merit some attention.

Innate genius is an ancient idea, closely associated with elite groups. The earliest accounts of genius as a 'divine gift' derive from classical Greek philosophy (Battersby 1988, 35; Plato 2008)—arguably the most elite of educational fields (Cookson and Persell 1985). The divinely-gifted genius idea perpetuates through received Western history; it is found in early and medieval Christianity, and while later Renaissance notions shifted to take into account the importance of mastery and labour in the production of genius—as for example in Vasari's *Lives of the Artists* (1550 and 1558)—it remains nonetheless an innate gift rather than an achieved state (Battersby 1988, 36).

This early concept of genius finds its poplar apotheosis in the highly influential Romantic model. Here, the Romantic genius is possessed by a creative force that approaches divinity (Kant, 2003); it is innate, spontaneous, and irrepressible inspired by 'the god within'; it cannot be learned (Young 1749, 101). It is this model which perpetuates most identifiably in the contemporary popular imagination (Kivy 2001). The Romantics' idea of innate genius also illustrates the workings of masculine privilege and appropriation described by LeDoeuff (2003). The most highly-regarded talents have historically been constructed as specifically male entities, even where traditionally feminised qualities are also evoked. The Romantic genius poet or musician may be imbued with imagination and sensitivity, but these potentially feminising qualities have to be united with a specifically male vigour and vision. They create a persistent tension in which masculinity has to be consistently reaffirmed and femininity contained and subordinated, lest it overpower its male possessor (Battersby 1988; Elfenbein 1996; Stadler 1999).

While reflections on the nature of genius had been the preserve of the philosopher and the art historian, towards the end of the nineteenth century, they became the concern of the scientist, namely the psychologist and the geneticist (Albert

1969). The notion of a measurable, hereditary form of innate genius can be seen as representative of development in the scientific thinking of the Victorian age in its technological innovation, but also as representative of its social conservatism. The fore-runner of psychometrics, the work of Galton in particular forms a foundation for later models of testing for 'giftedness' in children as a predictor of adult genius (Terman 1926). Interested in predicting eminence in the young, Galton designed his measurements through examining the biographies of great men (Galton and Schuster 1906).

A move from aesthetic evaluation, with all its elite assumptions, to the scientific measurement of exceptionality might be expected to lead to a more inclusive and expanded model. However, the shift signalled by Galton's work also represents what Delap (2004,102-3) has termed a 'closing down' of genius in its endorsement of gender and class restrictions through science. Since Galton's chief criterion was eminence in a narrow range of public fields, anyone who had not achieved eminence could not be considered a genius—and Galton maintained that 'genius will out' and no circumstances of birth or context could repress it. His method of drawing on retrospective biography is still supported by some psychologists late into the twentieth century—Eysenck (1995) uses it to come to the conclusion that there have been no women of genius.

Feminist scholars in diverse fields identify a legacy of gendered exclusion and appropriation in genius discourse persisting in the twentieth century: For example, Duchin's (2004, 3) study of genius narratives surrounding mathematicians finds that virility and power are stressed; male mathematicians are described as 'vigorous, alert,' and 'keenly interested in manly things'. The rare female mathematician, on the other hand, inevitably finds that her gendered biological destiny exerts a stronger pull than

her mathematical ability. In her study of gender and genius in Black music discourse, Rustin (2005) draws our attention to some ways in which musical instruments are gendered in twentieth-century jazz reviews to secure the masculine identities of male performers, and therefore have an exclusionary impact on women. A key legacy of the innate genius model is the need to reaffirm manhood; genius is masculinity enhanced, not effeminised.

It is possible to identify similar categorisations and anxieties in contemporary education contexts, in discourses of gendered learning and their relative valuation (Francis and Skelton 2005; Elwood 2010). Masculinised talent as innate and inevitably working its way out rather than produced by effort reappears in accounts of the erratic, inspired boy. Coursework— and the diligence and co-operation it fosters—is seen as a dilution of the more masculine vigour and rigour demanded by exams (Francis and Skelton 2005). They play out too in social and learning behaviours of pupils, in the compensatory efforts of some highly achieving boys to affirm their masculine identities in the face of academic success, and in the pressure they describe to achieve without the appearance of effort (Jackson 2006; Francis, Skelton & Read 2010; Jackson and Nyström 2015).

The diligent genius and the hard-working girl

The concept of the hard-working genius has historically existed in a subjugated binary with that of the inspired genius (Kivy 2001), and this binary is inevitably gendered. In 1758 Rousseau writes that women,

> can acquire a knowledge…of anything through hard work. But the celestial fire that emblazons and ignites the soul, the inspiration that consumes and

> devours…these sublime ecstasies that reside in the depths of the heart are always lacking in women. (1986, 225)

If the concept of innate brilliance illustrates the absorption of what is valued into the heritage of men, in the historical valuing of alternative models we can see the mirror process of 'casting off' of the devalued to the heritage of women (Le Doeuff 2003).

Post-structuralist critical examination of genius mythologies has involved a re-appraisal of debased models of achievement, and of the ways in which these have been cast as feminised. Some scholarship in the humanities endorses the notion of the hardworking genius as a part of the larger project of deconstructing the 'great man' of liberal humanist individualism. For example, Stadler's (1999) study of Victorian women's writing finds evidence of a concept of genius which is the result of sustained application rather than the descent of the muse; Miller's (2000) revision of the mythology of the Brontë sisters argues that, contrary to the popular notion of the Brontës as socially isolated genii receiving inspiration from the wild Yorkshire landscape, in fact their writing skills were finely honed over years of practice, and through both peer and expert mentoring.

Despite such competing accounts, the hardworking genius continues to be seen not only as a debased form but one which continues to characterise girls' achievement rather than boys' (Renold 2001; Skelton and Francis 2003, 2010; Mendick 2006). The contemporary productive, compliant, conscientious girl is positioned as the achieving 'Other' to the mercurial, assertive boy (Walkerdine 1989; Archer 2005; Skelton and Francis 2005).

Historically, the prospect of the female genius has provoked intense cultural anxieties: she is either at risk of unwomanliness or a threat to civilisation—or both (Battersby 1988). For example: Kant argues that it should never be attempted by a

woman because it ‘destroys the merits that are proper to her sex’ (Kant 2003, 78); Rousseau’s ideal republic separates women from men because of the dangers femininity posed to masculine vigour (Rousseau 1989); intellectual activity in women, typified in the pejorative ‘bluestocking—a term originally describing male politicians but later ‘cast-off’ to women (Le Doeuff 2003)—was held as unnatural and as such threatening (Bodeck 1976). In contemporary contexts we see the same patterns. The supposed diligence of girls is constructed as doubly problematic: not only is it seen to mask their own lack of innate ability, but the exam success produced by their diligence eclipses and renders invisible the superior, innate abilities of boys. This ‘hard-working’ discourse is a means of taking girls’ achievements into account and dismissing them, a ‘casting-off’ of both a learning behaviour and the results it produces. As with performance of effortlessness in boys, the culturally endorsed ‘hardworking-girl’ identity is taken up by girls a conscious strategy for balancing academic success and femininity through avoiding those achievement models associated with masculinity (Renold and Allan 2006; Allan 2010).

The ‘diligent achiever’ also serves as an educational category for the classification of the achievements of some minority groups. Jackson and Nyström (2015) have drawn attention to the cultural specificity of the valuing of effortless achievement in the West, describing how in Asian countries hard work is seen as the basis of excellence and is valued accordingly. Just as the work produced by hard-working girls in UK classrooms is seen as the ‘wrong’ sort of achievement, so the success of some Chinese and British Muslim girls is seen as produced by passivity and undue pressure from families (Archer and Francis 2006). The possible relationships that raced, classed subjects may have to even the narrow definitions of success within schools are complex and multi-layered(Archer, 2005).The hardworking-achiever

category appears broad enough to hold in subordination a complex range of variables in terms of gender, ethnicity and class, while masking the difficulties for disadvantaged groups in attaining legitimated forms of success. As Archer (2005, 21) observes, 'even the 'best' performances may still be judged as lacking in some way'.

The diligent achiever model is thus not only gendered as feminine, it is linked to other forms of structural privilege and disadvantage. In fact it first appears in the West as a response to the perceived elitism of the inspired genius model as a part of a wider discourse of aspiration from a newly wealthy middle class during the early industrial age. It expressed suspicion of aristocratic traditions of patronage and privilege, and through it we begin to see the growth of the notion of intellect, rather than inspiration, as central to genius as a new, virtuous and educated middle class argued for intelligence and merit as 'the basis of social distinction' (Hemingway 1992: 623). In this earlier association of the hard-working genius with social aspiration we can see a foreshadowing of contemporary ideas of educational meritocracy, particularly with regard to 'Gifted and Talented' agendas with their unclear blend of heritability and just deserts (Youdell 2004).The meritocratic ideal is extremely seductive; Tomlinson (2008, 69) describes it as 'theodicy of privilege', meaning that the fact that some may be disadvantaged by it does not conflict with their conviction of its essential rightness. Developing an historical sensibility to ways in which the hard-working category functions to define and contain the performances of subordinate groups helps illuminate how they continue to be cast as failures-within-success, and to challenge such a casting.

The collaborative genius and the caring, sharing girl

Running in direct opposition to narratives of the eminent individual and the solitary visionary, the collaborative model of achievement is not so much traditionally debased

as historically invisible. Its invisibility lies in its association with marginalised and subordinate groups, and it owes its contemporary discursive presence to revisionist work which seeks to challenge the basis of the 'great man' model of history.

Le Doeuff (2003, 36) has pointed out that the physical exclusion of women from institutions and formal processes of learning that has led to their being hidden from history. Socialist, feminist, and post-colonial revisionist works identify intellectual, scientific and artistic production emerging from previously obscured sources, and challenge the locus of production and ownership in the individual (Western) man (Battersby 1988; Machery 1989; Schiebinger 1989; Lunsford and Ede 1990; Stadler 1999).

Inherent in the collaborative model are both appropriation and casting-off; the achievements and expertise of subjugated populations are appropriated, and the role of collective production hidden. This has been attributed to the exploitations of early forms of capitalism: Zilsel (2003) argues that it was capitalist activity that first brought together the educated classes with the skilled craftsmen, thus uniting trained thinkers with practical experimenters and expert artisans. From this encounter, the educated classes emerged with the credit. It led to the establishment of scientific principle which drew on artisanal skills, and it is these skills that Zilsel identifies as the 'forerunners of the physical laws of modern science' rather than lone scientists' individual inspirations (14). Conner (2005) extends this thesis; he too challenges canonical conceptions of science and specifically the cult of genius. Like Zilsel, Conner contends that the production of scientific knowledge was not the work of a series of luminary greats. Furthermore, he asserts that knowledge creation is essentially a social activity and collective in nature; and he challenges the Euro/ethno-centric nature of scientific knowledge through exploring aspects of its Afro-Asiatic roots. Conner also draws

attention to the exclusion of women from expert productive artisanship (except midwifery) and so from narratives of scientific eminence.

The importance of collaboration for women as a means of overcoming institutional and cultural exclusion from certain fields and kinds of learning emerges from revisionist work. Schiebinger (1989) traces the historical exclusion of women from institutions, cultures and practices of early modern science, including the ways in which their collaborative contributions were habitually diminished or ignored. Exploring genius discourses in mathematics, Duchin describes how the lone (male) genius model obscures 'the important community aspects of mathematics…controlling who would even think to enter the field' (Vanderkam, 2008 n.p.). Le Doeuff particularly recognises the value of collaborative work for women in ending their intellectual isolation, especially in research which 'involves going off the beaten track in search of items passed over by an establishing structuring of knowledge'. Engaged in feminist revision work and finding it difficult to track down a source she describes a young colleague 'handing me bibliographic information across the back fence' (2003, 6), a knowingly domestic image to describe alternative routes for the transmission of feminist knowledge.

We can see evidence of the emergence of theories of collaborative production in the humanities as well as the sciences: Kelley (2008) highlights the collaborative nature of genius in what she terms 'self-reliant circles of practice' in (White) women's writing, and traces a line from nineteenth-century collaborative practices to contemporary scholarship as a collective enterprise; Royster (1989) similarly explores the history of collaboration in the development of Black women's writing. Brandels (2008) posits a model of genius as both collaborative and contextual, taking due account of the artisans

and communities involved in the various stages and practices of production, for example asserting that:

> Genius did not descend upon (Gertrude Stein) from the heavens as she sat working solitarily in her room of her own, but instead was a result of numerous influences and countless collaborations (385)

The politics of collaboration as a challenge to both capitalist and patriarchal structures is highlighted Stollery's (2002) analysis of the gendering of genius in early modernist USSR film. He demonstrates Soviet reversal of the two key principles of an organising hierarchy of genius in the Western liberal tradition: the individual over the collective, and the association of the more debased form with female production. He shows how 1920s Soviet Russia saw Western concepts of individual genius as 'self-regarding, dedicated to creation of individual biography' (as exemplified in the work of the male film-maker Sergei Eisenstein) and sought instead to promote collective principles, and, in film-making, social truth over aesthetic effect (as exemplified in the work of the female archivist and film-maker, Esfir Shub). Such revisionist work models a Foucauldian questioning of categories and the power structures they reflect and support.

The association of individualist, masculine genius with neoliberal thought in particular (Friedman 1964) would at first seem to be at odds with the prominence of contemporary 'successful girl' discourses. Neoliberal discourses of success appear to promote learning and professional behaviours traditionally deemed feminised (Calas and Smircich 2006): collaboration is enjoying popularity within cultures of work, where the superiority of the group and the valuing of communicative, cooperative workers emerge in both professional and academic fields (Kinnick and Parton 2005). These discourses however exist in tension with those of individualised competition and

should not be taken in themselves as evidence that women themselves are more highly valued in the workplace (Adkins 2002). While the ideal neoliberal subject may be seen as feminised in terms of self-reflexiveness, responsibility and industriousness—the qualities embodied in the figure of the achieving girl (Walkerdine 2003; Harris 2004)—others argue that cultural feminisation works to inculcate such behaviours in men rather than to value them in women (McDowell 1997; Adkins 2002). In schools, compliance and cooperative learning continue to be required but are also positioned as feminised and inferior to competitive, individuated masculinised achievement. As with the feminised qualities which are appropriated to characterise the male Romantic genius (Battersby 1998), collaborative and cooperative behaviours are valued and rewarded when demonstrated by men and boys; in women and girls they are merely seen as evidence of biology.

The masculinisation of rationality and the gendering of school subjects and spaces

If imaginative and creative aspects of genius have historically been combined with a specifically masculine vigour to produce the male genius, in domains associated with the exercise of logic, analysis and rationality no such compensatory combination is necessary; these domains are already closely associated with masculinity. This association forms a cornerstone of Enlightenment philosophy (Battersby 1988; Walkerdine 1988); the gendered dichotomy it creates is not only fundamental to Western philosophy, but forms the basis of the ways essential distinctions between female and male genders are conceived (Lloyd 1989). These distinctions still play out in the gendering of school subjects and in wider learning domains. Jay (1981, 54) suggests that such dichotomous models of thinking both work to sustain privilege and are also particularly resistant to change because those who subscribe to them ‘find it

very hard to conceive of the possibility of alternative forms of social order (or third possibilities). Within such thinking, the only alternative to the one order is disorder'. This may explain the persistence of Cartesian dualism within gendered learning myths.

Early feminists had much to do to counter doubts about the very existence of the female intellect let alone its capacity for excellence, and so tended to argue first and foremost for the understanding of woman as rational beings, capable of independent intellectual endeavour and deserving of the same education as men—most famously Mary Wollstonecraft's A *Vindication of the Rights of Woman* (1792). Le Doeuff argues that women's exclusion from the status of rational knowingness is associated with their exclusion from the physical institutions of learning. A denial of presence is also a denial of process—outside institutions of learning women did not develop familiarity with the 'exercise of logic and dialectic' (Lloyd 1989), the argument, the lecture and the seminar, all of which cultivate rationality (Le Doeuff 2003). As Le Doeuff states, 'deprivation stems from prohibition' (36).

Although girls and women are no longer physically excluded from learning institutions, there is a wealth of evidence suggesting that they are both excluded and self-excluding from the classroom processes that cultivate 'rationality'. Walkerdine (1989, 46) argues that for girls, engaging in debate especially with teachers and in a public arena implies the assumption of a kind of masculinised power. While it can bestow a certain kind of enhanced status, the earning of teacher recognition through the rationalities of highly visible classroom discourse can mean girls have increased difficulty in negotiating feminised and social identities. As Gonick (2003, 131) observes, making claims to space within the classroom is a risky undertaking precisely because the behaviour is deemed unfeminine. Teachers can reinforce the gendered dichotomy, demonstrating differing questioning styles and expectations when dealing

with girls and boys, especially in 'rational' subjects such mathematics (Benjamin et al. 2003).

Understanding the history and role of dichotomous thinking in sustaining gendered learning myths may support the development of alternatives, first through understanding that the articulation of 'third possibilities' (Jay, 1981) may be necessary in overcoming dichotomies. Work uncovering the patterns of historical exclusions in contemporary classroom interactions such as that by Walkerdine (1989) and Mendick (2005) is central to this endeavour.

Historical sensibility, science and gendered learning

The persistence of belief in gendered learning patterns into the twenty-first century can be in part attributed to the 'new sciences' of psychology in the nineteenth century and neuroscience in the twentieth. Both of these sciences make a range of essentialist claims relating to learning preferences and biologically-ascribed gender. However uneasy these claims might make their audience, challenging them seems to require 'advanced, discipline-specific skills or knowledge' (Tinkler and Jackson 2014, 73), thus creating difficulties for the lay person, or indeed the social scientist, in countering them. The alacrity with which neuroscientific 'truths' about gender become accepted educational norms is a disturbing reminder of the tenacity of gendered binaries. Jay (1989, 47) argues that 'taken for granted distinctions are dangerous' precisely because of their 'peculiar affinity with gender distinctions' and stresses the importance for feminist theory to be systematic in recognizing them.

Countering the claims of such sciences is both particularly necessary and particularly difficult for the feminist scholar, as not only does the science appear to offer proofs of essential gendered distinctions, feminist analysis itself is dismissed as political

(Le Doeuff 2003; Fine 2010). Examining the uses to which sciences are put and questioning the categories they create or reinforce enables us to recognise the ways in which despite their claims to novelty, 'they are often activated by longstanding tropes' (Pickersgill 2013)

For Victorian feminists, emerging scientific models of genius had profound repercussions in divorcing feminism from its philosophical roots in egalitarianism. In acceding to the new sciences of intellectual difference, women accepted a remit which involved promoting a feminism that 'defined its role around the socialising genius of women's complementary sexuality', promoting their 'cultural mission' and 'co-operative destiny' (Alya1977, 277). This in effect constitutes 'new sexual contract' for the Victorian feminist constructed along similar lines to that described by McRobbie (2009), whereby women are allowed a certain presence and visibility within traditionally masculine preserves and spaces, but that presence is rendered non-threatening through its association with enhanced femininity.

It is not only in a gendered division of roles regarding family and professional life, and an acceptance of women's civilising influence in general that such discourses promoted complementarity; it was held to exist within the field of scientific enquiry itself (Alaya 1977; Schiebinger 1989). For example, Buckle (1858) states that while women 'are capable of exercising and have actually exercised an enormous influence' over the progress of knowledge', such influence lies in improving and refining the different and superior talents of men. In what he describes as a 'coalition, a union of different faculties' he expresses hopes that:

> the imaginative and emotional minds of one sex will continue to accelerate the great progress, by acting upon and improving the colder and harder minds of the other sex (1858, n.p.)

The acceptance of complementarity not only strengthened a binary conception of gendered intelligence, but vitiated the climate of feminist debate itself. There was such scientific force in the argument that women's particular talents connected them with altruistic and sacrificial virtues, that challenges to the proposed different-but-complementary roles of the sexes made little headway; feminist argument was disarmed by the social and psychological uses to which the new biology was put (Alaya 1977).

Both Battersby and Alaya have pointed out ways in which the Victorian science of gendered intellectual difference itself was flawed: in its empirical, apparently objective methods for measurement which fail to acknowledge their own cultural groundings and therefore (gendered) bias (Battersby 1988, 181), and in its persistent refusal to consider context and the impossibility of scientific control (Alaya 1977, 273). These criticisms are revived in some contemporary feminist critique of 'neuorosexism' (Fine 2010). The invocation of science to reify sexual difference and defend gendered inequalities takes on a disturbing renewed vigour and relevance in contemporary discourses of neuroscience. The same patterns of circulation, and function with regard to the shoring up of gendered dogma as in Victorian discourse can be observed; now, as then, we can see a 'casting-off' of less-valued forms of cognition onto women, framed as complementarity.

Despite the infancy of neuroscience and the tentativeness and complexity of its early findings (Francis and Skelton 2005), works expounding theories of gendered cognitive and neuroscientific difference such as *The Female Brain* (Brizendine, 2008) have gained in popularity and become translated into educational practice, for example in *Teaching the Female Brain* (James, 2009). The circulation of science and into popular domains and its use to support existing dogma are illuminated by Hasinoff (2009), who shows how the discourse of socio-biology has circulated in women's

magazines since the 1990s, displacing other accounts of gendered difference, and supported by an invoking of scientific expertise. Examining the circulation of gendered neuro-myths in contemporary conditions of digital media convergence, O'Connor and Joffe (2014) track the journey of a high-profile study of neurobiological sex-differences through five media domains: the original scientific article, the press release; the traditional news platform; online comments on that platform; and blogs discussing the news item. They find that scientific 'proofs' are framed within gendered stereotypes at each stage. Their findings show that neuroscience is invoked by both experts and non-experts to support pre-existing notions of subordinated complementarity, even to the point of citing categories of learning behaviour which do not feature in the findings of the original experiment, such as women's ability to 'multi-task'.

Useful work is being undertaken to counter such mythologizing; some of this deals directly with methodological flaws. Paechter (1998) for example, argues that the claims of neuroscience itself need to pay greater attention to the effect of socialised context on neural development, thus reversing the argument that different brains create different gendered behaviour and calling for a focus on how nurturing different behaviours may shape brains differently. Chalfin, Murphy and Karkazis (2008) call for the establishment of specific 'women's neuroethics' that continue to question issues of wider gendered categorisation in scientific enquiry. Fine (2010, 172) undertakes a detailed critique of the flawed method of a keys studies. She observes how contemporary gender stereotypes are legitimated by 'pseudo-scientific explanations' invoking the brain with no regard for their validity. She also addresses neuroscientific explanations' neglect of context and cultural grounding, advancing similar critique to Battersby (1988) and Alaya (1977) in their consideration of Victorian scientific claims.

Conclusion

Foucault (2003:9) asserts that 'genealogies are, quite specifically, anti-sciences'. By this he does not mean a rejection of concepts, methods or knowledge that sciences produce but rather a challenge to 'the power-effects that are bound up with the institutionalisation and workings of any scientific discourse' within wider society. Claiming objectivity and rationality of method, scientific 'proofs' of gendered learning difference have historically involved a turning away from philosophical and political questions of equality, yet it the knowledge produced draws on and re-animates historical and taken-for-granted dichotomies circulating in the wider imaginary.

Tinkler and Jackson (2014) highlight the importance of developing 'historical sensibility' not only in understanding 'how history is (mis)used in discourse' (83) but in questioning 'novelty claims' (73). In developing a critical, historical sensibility to the essentialising claims of 'new' sciences with regard to gender and learning it is possible to reassert the centrality of the feminist political struggle which is too often dismissed as dogma itself when science is examined through its feminist lens (Le Doeuff 2003). Le Doeuff's model of concentrating on the social values and categories assigned to gender rather than on 'woman' as a knowable object, her suggested heuristic of tracing the privileged and the 'cast-off' discourses, enable a questioning of both the essentialism of gendered learning myths and the deterministic claims made in the name of neuroscience through exposing their cultural foundation and historical function. Nonetheless, the alacrity with which neuroscientific 'truths' become accepted educational norms is a disturbing reminder of the tenacity of gendered binaries. Le Doeuff (2003, x) observes that the problem of the persistence of such a myth as the gendering of learning may be 'insoluble precisely because it is false'.

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