TELLING CHOICES: AN EXPLORATION OF THE GENDER IMBALANCE IN PARTICIPATION IN ADVANCED MATHEMATICS COURSES IN ENGLAND

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Introduction

In England, the evolving gendered patterns of attainment in mathematics need to be juxtaposed with the unchanging gendered patterns of participation in the subject. There are very few remaining differences between the attainment of male and female students in either GCSE, AS, or A-level mathematics examinations (taken at ages 16+, 17+ and 18+ respectively) (Gorard et al., 2001; Guardian, 2002a, 2002b). Although boys are still more likely to secure the top A* and A grades at GCSE and A-level respectively, the differences are small and getting smaller. In contrast to these shifting patterns of attainment, the decision to continue with advanced mathematics remains highly gendered. This polarisation persists despite decades of feminist intervention; as Shaw (1995, p.107) says, “the most striking feature of subject choice is that the freer it is, the more gendered it is”. In fact, as the graph above shows, from 1994 to 2002 inclusive, the proportion of the total number of 17 and 18 year-olds entered for A-level mathematics in England who are male showed little change, dropping only slightly from 65% to 63% (Government Statistical Service, 1995, 1996, 1997, 1998, 1999, 2000, 2001, 2002; Guardian, 2002b). This greater participation of males in mathematics courses becomes more pronounced as you go up the levels from A-level, to undergraduate, and then to postgraduate, and is reflected in the larger number of men than women working in mathematically-oriented fields.

Mathematics is a powerful subject, a signifier of intelligence that acts as a ‘critical filter’ (Sells, 1980) controlling entry to high status areas of academia and employment. Thus, for those concerned with social justice, it is pertinent to ask: how is it that people come to choose mathematics and in what ways is this process gendered? This is the question that I address in this paper. I do this by analysing interviews with two young women, Toni and Claudia. These interviews are part of a larger project that involves interviews and observations
of 42 young Londoners (aged 16-19) who have chosen to continue studying mathematics beyond compulsory education. In the interviews students were asked to describe a typical mathematics lesson, about what they had enjoyed most and least about mathematics, for their feelings on different teaching styles, to compare mathematics with other subjects, to explain their subject choices and their future plans, and for their feelings on gender. I analysed these interviews as narratives-of-self and then developed connections between them.

In an earlier paper (Mendick, 2003b) I discussed one such connection. I told stories of three of the male participants who were using mathematics to prove something about themselves to others. Simon chose mathematics, in spite of the way its curriculum violates his notions of ‘commonsense’, in order to prove his worth to potential employers; James also chose mathematics as a way of securing his future within the labour market; Michael chose mathematics because he wanted to use its reputation as a hard subject to prove his intelligence to those around him. I argued, using work on school masculinities (for example, Connell, 1989; Mac an Ghaill, 1994), that, in choosing mathematics, these boys were doing masculinity. This current paper is an attempt to explore the potential of applying this idea, that **doing mathematics is doing masculinity**, to young women and examine how such performances of masculinity are affected by one’s daily existence as a woman. In the mathematics education literature it is commonly argued that the masculinity of mathematics makes it more problematic for girls and women to choose and succeed at the subject than for boys and men. However, my aim here is to use this unusual theoretical approach to imbue this idea with new meanings and new understandings.

**Differing lenses on ‘the problem of girls and mathematics’**

In this section I outline my theoretical approach to ‘the problem of girls and mathematics’. I begin by critiquing common approaches within the literature. Explanations of the gender imbalance in participation in mathematics can be split into two categories: biological and sociological. Usually biological and sociological explanations are seen as being directly opposed (Dunne & Johnston, 1994). In contrast, I argue here that they share some key assumptions about gender, and, in particular, the ways in which the relationships between the terms in the following interlinked oppositions are imagined:

- **Biological/Social**
- **Individual/Social**
- **Gender/Sex**
- **Masculine/Feminine**

After this, I develop my alternative post-structuralist approach showing how differently it imagines these relationships.

Biological explanations are generally based on average gender differences in measures of ‘spatial and mathematical abilities’ or in measures of self-esteem, confidence and anxiety. These data are then theorised using arguments from evolutionary psychology. The problems with biological explanations are well rehearsed. I mention just two points that are central to my reasoning. First, within such arguments biology exists as a category that can be separated from social processes. However, biology always functions in a social context and is unthinkable outside it (Boler, 1999; Caplan et al., 1997; Fausto-Sterling, 1985).

We habitually think of the social as less real than the biological, what changes as less real than what stays the same. But there is a colossal reality to history. It is the modality of human life, precisely what defines us as human. No other species produces and lives in history, replacing organic evolution with radically new determinants of change. (Connell, 1987, p.81)
Second, individuals too are viewed as separable from socio-cultural practices. This had particularly damaging consequences when applied to explanations based in female lack of self-esteem, confidence and so on, where the psychological approach meant that researchers “had ‘no idea’ how this might arise; these characteristics were, it seems, a corollary to being born female” (Willis, 1995, p.189) Thus, these arguments construct ‘the problem of girls and mathematics’ as residing within the girls (see the critiques: Chetcuti & Griffiths, 2002; Kenway & Willis, 1990). It is in an attempt to avoid this that I turn to sociological explanations

Feminist researchers have generated a large number of sociological explanations for the male dominance of mathematics: lack of female role-models, widespread gender stereotyping, boys’ dominance of educational spaces, sexual harassment in educational institutions, the gendered nature of knowledge, and gendered preferences for different teaching, learning and assessment styles. Theoretically these are based in the idea that boys and girls have different experiences and so develop different ‘abilities’ and interests via a process of sex-role socialisation. In this way, it is argued, sex, the biological difference between men and women, is detached from gender, the sociological difference, so making change possible.

The sex/gender distinction works with an idea of the interaction of the biological and the social in the construction of individuals. This raises many questions: What is it that is supposed to be interacting? (Birke, 1999) Where are these interactions taking place? (Blackman, 2001) And:

Whether the discourse which figures the action of construction as a kind of imprinting or imposition is not tacitly masculinist, whereas the figure of the passive surface, awaiting that penetrating act whereby meaning is endowed, is not tacitly or-perhaps-quite obviously feminine. Is sex to gender as feminine is to masculine? (Butler, 1993, p.4)

The problem is that the “model of interaction (however complex an interaction is asserted) leaves the idea of an unmediated biology unchallenged” (Henriques et al., 1984, p.21). This results in basically the same construction of the biological/social dualism as operates in biological explanations and forecloses possibilities of building new understandings of the role of biology in making us who we are.

If sex and gender are seen as independent then, even if a binary form of sex is assumed, there is no necessary reason why there should be only two genders nor why male bodies should become gendered as masculine and female bodies as feminine (Butler, 1999).

Can we refer to a ‘given’ sex or a ‘given’ gender without first inquiring into how sex and/or gender is given, through what means? And what is ‘sex’ anyway? Is it natural, anatomical, chromosomal, or hormonal, and how is a feminist critic to assess the scientific discourses which purport to establish such ‘facts’ for us? Does sex have a history? Does each sex have a different history, or histories? Is there a history of how the duality of sex was established, a genealogy that might expose the binary options as a variable construction? Are the ostensibly natural facts of sex discursively produced by various scientific discourses in the service of other political and social interests? If the immutable character of sex is contested, perhaps this construct called ‘sex’ is as culturally constructed as gender; indeed, perhaps it was always already gender, with the consequence that the distinction between sex and gender turns out to be no distinction at all. (Butler, 1999, p.10-11)

Here Butler eloquently pushes the sex/gender distinction to its limits and, under the pressure, it self-destructs before our very eyes. Sex itself is gendered; the pre-discursive category of sex is produced as an effect of the systems of cultural construction that we call gender.

However, I do not want to replace the model of the interaction of the biological and the social with a social constructionist position that dismisses biology altogether, engaging with it
only to critique its reductionism. With Blackman (2001, p.211), I am concerned that “what is often overlooked is that ‘biology’ as an object, shifts and changes in meaning and cannot pass as a stable, constant category, which we can simply reject” and so the biological/social dualism remains intact and we delegate to biology all discussions of what goes on beyond the surface of the body except for that small portion claimed by psychoanalysis (Birke, 2001). Instead I view biological and psychological processes:

As generative potentialities, which can be transformed through the strategies and practices we develop to identify and act upon these processes. These processes are also not static, constant categories, but are produced in relation to different ways of understanding what it means to be human, across a range of practices which ‘make up’ the social. (Blackman, 2001, p.226)

This is a post-structuralist approach to the body. Regarding post-structuralist approaches to the relationship between the individual and the social, it is useful to compare these with sex-role socialisation, the process by which sexed individuals are thought to take on social gender.

Within the sex-role socialisation model of the world the child is taught her or his sex-role by, usually, one central adult, but is also ‘pressed’ into maintenance of that role by a multitude of others (peers, media etc.). There is no room in this model for the child as active agent, the child as theorist, recognising for him or herself the way the social world is organised. Nor is there acknowledgement of the child as implicated in the construction and maintenance of the social world through the very act of recognising it and through learning its discursive practices. (Davies, 1989, p.5)

The child is positioned as passive, as acted on, within the story of their socialisation. Moreover there is a simple model of cause and effect operating in which certain aspects of the social world are seen to be directly causing gendered behaviours in children (Connell, 1987; Henriques et al., 1984; Walkerdine, 1998). Again the individual is imagined as essentially distinct from the social.

Post-structuralism makes no such distinctions.

Poststructuralist theory argues that people are not socialised into the social world, but that they go through a process of subjectification. In socialisation theory, the focus is on the process of shaping the individual that is undertaken by others. In poststructuralist theory the focus is on the way each person actively takes up the discourses through which they and others speak/write the world into existence as if it were their own. (Davies, 1993, p.13, original emphasis)

Discourses are “practices that systematically form the objects of which they speak” (Foucault, 1972, p.49). These knowledges about objects are powerful because they determine what can be said, as well as who can say it, and even what can be thought or imagined. For example, some of the discourses of mathematics variously frame it as: a key skill, a process for discovering a body of pre-existent truths, a route to economic power within advanced capitalism, the ultimate form of rational thought and so a proof of intelligence, and as associated with forms of cultural deviance. Taking a post-structuralist approach means that these discourses are seen as operating within regimes of truth, not because of their power to describe reality but because of their power to produce it.

Central to post-structuralist conceptions of the self is the process of subjectification through which people take up positions in discourses. Discursive practices are imagined as negative and positive, oppressive and productive, simultaneously and always.
If power were never anything but repressive, if it never did anything but to say no, do you really think one would be brought to obey it? What makes power hold good, what makes it accepted, is simply the fact that it doesn’t only weigh on us as a force that says no, but traverses and produces things, it induces pleasure, forms knowledge, produces discourse. It needs to be considered as a productive network which runs through the whole social body, much more than as a negative instance whose function is repression. (Foucault, 1980, p.119)

Thus power is exercised locally and wherever there is power there is also resistance. This idea captures the double-edgedness of power and is the basis of a conceptualisation of agency (see Butler, 1993).

Summarising, it is within a range of discourses that an individual’s educational choices and experiences are constituted. So instead of asking ‘Why do girls/boys engage in specific practices?’ the question is reversed to ask ‘How do specific practices do girls/boys?’ (Flax, 2002) “Gender is always a doing, though not a doing by a subject who might be said to preexist the deed’ for “there is no gender identity behind the expressions of gender; that identity is performatively constituted by the very ‘expressions’ that are said to be its results’ (Butler, 1999, p.33). Female-ness and male-ness are produced through reiterative performances, in such a way that they appear to precede these performances, and so are experienced as authentic/natural by the performer/possessor. These ideas amount to a radical transformation of the relations between the biological, the social and the individual in making-up gendered people. To demonstrate their value I use them to understand Toni and Claudia’s mathematical choices and experiences.

**Toni’s story**

Toni was “born here [England]. But then I moved to America when I was like five. So I came back in June and my mum is from Africa, in Gambia. My dad is half Jamaican…And my mum is half Nigerian and half Gambian.” Her father died nine years ago and her mother is a flight attendant. She is studying biology, chemistry, and mathematics. She chose these because of her desire to be a doctor. “I just like curing people” and “prescribing things, you know. Telling them: ‘take this and you’ll feel better!’…Basically I just wanna be the person that knows everything. Like when you’re sick yeah, I wanna be the one to tell you that ‘OK take this thing yeah and when you take it you’ll feel better and stuff’. I just like, just helping people I guess…And I like working with kids also.” Toni mentions several reasons for wanting to be a doctor in this passage but her desire to control others seems to be the central one (the traditional feminine roles of helping others and caring for children seem to be afterthoughts). She wants the status, respect and influence that come with medical qualifications. Similar motivations are present in her relationship with mathematics.

Toni has little to say about a typical mathematics lesson, she mentions only the length of the lesson and her grades: “It was great. Besides the timing was really short. I mean it was really quick. You know that was the only thing. But it was all right. I mean I had good grades anyway so, I was OK.” One way that Toni uses mathematics to position herself as powerful is through obtaining good grades. Within the interview she displays a strong orientation around getting the qualifications necessary for her future plans. This is the reason that she gives for studying in England rather than America: “When you have like your um degree or certificate that you get for taking your AS, it’s really good when you go back to America because you can easily get a university…That’s why I’m here.”

However, it is not just the good grades that Toni gets that enable her to use mathematics to feel powerful. That she is using the status of mathematics as a signifier of intelligence is evident in the discussion of what other people, not doing mathematics, think of the subject: “they think maths is so hard. And whoever’s doing maths is so brainy. That’s what everybody thinks.” We then go on to talk about subject stereotypes more generally and I ask from where she thinks they come: “OK someone like me I’ll go and I’ll be, ‘I want to be so smart’ or ‘I
want them to think that I’m so smart’ and I’ll go ‘Oh my god, maths was so hard! You should see, look at this $x$, $x$, $x$.’ Just to make them think that I’m so smart you know. And then they’ll be like ‘oh my god she’s smart’ you know, something like that.”

Toni’s recognition of the power of mathematics is coupled with scepticism about the subject’s utility. In the interview she asks, “What’s the use of maths?” explaining, “when you graduate or when you get a job, nobody’s gonna come into your office and tell you: ‘can [you] solve $x$ square minus you know?’…It really doesn’t make sense to me. I mean it’s good we’re doing it. It helps you to like crack your brain, think more and you know, and all those things. But like, nobody comes [to] see you and say ‘can [you] solve this?'”

So Toni’s attachment to mathematics is related to her desires to have power over others, to be thought intelligent by them and to build her future relationship with the labour market. In other words very similar to those of Simon, James and Michael. In their cases I have no problems reading such a pattern of identifications as part of their masculine identity projects, but I have more difficulties and discomforts in Toni’s case because she ‘is’ female. So I want to supplement this reading with the argument that masculine performances are not unaffected by the side of the gender binary on which their actors live. There is evidence that people who make non-gender traditional subject choices, in general, have more conservative views on other aspects of gender roles (for example, Thomas, 1990; Whitehead, 1996), as if their “gender category maintenance work” (Davies, 1989) demands such conformity to compensate for their ‘transgressions’ in other areas. In order to begin exploring the tensions between doing masculinity and ‘being’ female, I end Toni’s story with her contradictory experiences of femininity.

“Sometimes I wish that I was a boy,” Toni tells me. “‘Cos you know why? Boys are really easy going…Basically I say that because like, girls are really, they take too much time first off, like making their nails doing their hair…If I was going to a party tonight, I would’ve been planning it since last week or even last month talking about ‘oh what dress shall I buy, you know that silver one’, or talking about ‘oh my nails, my hair’. You know, boys just cut their hair, take some trousers, any kind of trousers, some nice shirt, it don’t even have to be nice, some full shoes, and they are gone. Nothing else. Nothing else. But us it’s just too much work.”

Toni describes the huge amount of time she devotes daily to getting ready for college. She finds this draining and in the next passage she questions its necessity although she also feels obliged to continue. “If you think about it, there’s no point to it, because like, OK you just want to feel good, you know. But it’s not like you coming to school to attract anybody. So somehow it doesn’t make any sense, you taking your time dressing, but you know, trying to look good. But in some other way, you’re trying to just feel good about yourself. So it’s really different. It’s two different things. People dress for boys, some girls, and some girls just dress because they feel like dressing that way and some people just wanna look good. But some people say, ‘oh she ain’t got no money’ or something like that ‘she’s poor’ or something.” Toni’s views are reminiscent of those of the white working-class female students in Skeggs’ (1997) research, who found their physical presentation proscribed by the powerful notion of ‘respectability’.

They operate with a dialogic form of recognition: they recognize the recognitions of others. Recognitions do not occur without value judgements of real and imaginary others. Recognition of how one is positioned is central to the processes of subjective construction. (Skeggs, 1997, p.4, original emphasis)

Along with one of Skeggs’ participants, Toni evokes “a sense of being caught up in something which is beyond her control”; the risks of getting out are too great, hazarding “cultural stigmatisations in her local situation; a challenge to all her friends who collude in femininity; a sign of difference” (p.102).

In this discussion I argue that, while being masculine carries an appeal for Toni, she is also (understandably) heavily invested in producing herself as female, both in her own eyes and
in other people’s. In order to do this she draws on the discursive practices that produce people as masculine or feminine. The tension in these passages between wanting to dress recklessly like a boy and wanting to be recognised through her dress as a girl, suggest that we could understand there being similar tensions contained in her desires for control and for mathematical success (discussed earlier). I continue my exploration of the tensions that are experienced by young women studying mathematics in Claudia’s story.

**Claudia’s story**

Claudia, an ambitious young woman, is interested in becoming a barrister. Her family moved from Algeria to Scotland when she was four, and then later to London. In her interview she distances herself from her childhood, for example, through her absence from the phrases, “my mum and dad are from Algeria” and “they lived there till I was four and a half”. She is studying five subjects, instead of the usual four, but “if you could do six, I’d be doing six” because “I don’t feel alright, if I’m not doing, if I know I’m not doing the hardest thing possible, I’m not really exerting myself, I don’t like it”. Her subject choices: chemistry, English literature, French, history and mathematics, cut across the academic curriculum. They represent Claudia’s desire for challenge as well as her self-presentation as sophisticated (she prefers to sit at the back of the class and is disdainful of those eager to answer questions), “defiant” (“I don’t [take] things as they’re told to me”), and determined. She also jokingly describes her programme of study as “self-torture” suggesting that it is associated with pain, as it is for the middle-class women in Walkerdine et al. (2001, p.179) whose “educational lives had been rigidly circumscribed by the expectations of academic success, often to such an extent that quite outstanding performances were only ever viewed as average and ordinary”.

This ambiguity can be read in Claudia’s subject choices. With French she clearly wanted a challenge: “I went to France last year, in the summer sorry, and I realised I wasn’t quite as good at French as I always thought I was, so I thought I should take it up”. She is trying to prove that she is as good at French as she thought she was and clearly thinks she should be. However, because Claudia keeps raising her academic targets, I doubt she will ever be able to do enough to prove herself to herself. Thus this continual challenge seeking may both destructive and productive. This double edged-ness is clearer in her talk about mathematics.

Claudia employs a militarist metaphor to explain her choice of mathematics: “I like the fact that I’ve got to conquer these numbers”. However, as well as her evident pleasure in the power she gets from such conquests, she explains, “sometimes I dread going into [maths], ‘oh now I’ve got maths’ but I think that’s just because of the…stigma attached to maths. It’s like, ‘oh, maths, numbers, er’. I don’t dislike it. It’s not my favourite subject. I’m doing it, I’m doing maths sort of because I know it will be a challenge to me and it’s useful and it’s good, I think it’s good for your brain to do maths.” These painful aspects of Claudia’s mathematical identifications are also manifest in the way she froze in her GCSE examination: “I was so scared of not having done enough maths revision.” So when “I went into the exam for the first few minutes I was just really scared stiff, I couldn’t do anything. I just kept staring at the first page and just reading it and not taking it in at all.”

In explaining Claudia’s “dread”, her account of being sent, aged 12, to special mathematics classes is important. “I was like always top in the class, top in the year, and…myself and a couple of other students were selected from the year to go to these advanced maths classes…And they were really, really hard.” The classes covered “really super, super maths for really clever people…and so me and my friend would just sit there and sort of draw, doodling and so, I think, there’s often been times when I’ve like been inclined to be scared of maths ‘cos of not understanding it.” Claudia’s fear relates both to the gendered myth of mathematical genius (Mendick, 2003a) and to the constant threat of just “not understanding it”, and so of being judged inadequate/wrong (Buxton, 1981).

Her experience of mathematics can be read as gendered in two further ways. First, she tells me that, while she has always been “good at mental arithmetic” and “just thinking in
numbers comes quite naturally to me”, she has problems with “harder maths”. This distinction draws on the gendered discursive oppositions reason/calculation and hard/easy (Walkerdine, 1988, 1997). Second, despite negative feelings, she chose mathematics. The high status intellectual challenge that mathematics represents is central to this, but so are her teachers. Claudia’s version of mathematics is relational: “[Mathematics] really depends on the person you have teaching you.” She tells me that, in GCSE, “the first teacher I had I didn’t really gel with him so…I didn’t feel I really achieved anything” but the following year a “really good” teacher took over. When I ask why this teacher was so good, Claudia hesitates then observes an “odd coincidence was that the teacher who I had for [ages 11-14] was a lady, and the teacher who I found to be good was also a lady…I think it was…the way she treated us, the way she spoke to us, especially like my little group, was really, it was more personal.”

However, despite this, Claudia is reluctant to read the influence of gender into her educational choices. After she has talked briefly about possible physiological and sociological reasons for the gendering of subject choice, I ask about the general impact of gender on her life: “I read something about if you’re a barrister, female barrister, you have to accept that men will go further than you, which I think is a bit ‘er, no they won’t!’ I want to be the best.” We laugh. “Obviously men still get better pay, don’t they? Erm, I don’t know, I’m not really a feminist. I don’t think that, I don’t know all about that equality thingy and stuff…I think if you’re male then you have more of a chance of being more career orientated and even if you’re not career orientated, ‘cos well women produce children, funnily enough, um it’s sort of split between the two. So men are more likely to become leaders and more important people, have more jobs, and so it becomes a man’s world really. And women are still um second-class. I mean I’ve heard that said a lot but I don’t know how true it is…It’s becoming less and less true, but I think it is, it is true in sort of, in terms of the hard facts it is. Like figures and stuff. Who has what jobs, who earns what, who owns what, who has power, stuff.”

Claudia resists connecting being female to lacking power and to disadvantage within her own life. Instead she attaches these to generalised ‘others’ and to the impersonal realm of reports, statistics and theories. Claudia’s account can be disrupted by reading it in the context of Rose’s (1999, p.ix) discussion of neo-liberalism’s insistence that “each individual must render his or her life meaningful as if it were the outcome of individual choices made in furtherance of a biographical project of self-realization”. Claudia reads herself through this fiction of the autonomous self. A fiction that, as Claudia’s story illustrates, creates more tensions for girls than for boys:

Now that girls can, in principle, take the place previously accorded to their brothers, their production as the bourgeois subject is a huge struggle and is never simply or entirely achieved, and certainly not without terrible penalties for body and mind. This view of what happens to the girls is in complete opposition to a simplistic notion of a genderquake as a freeing feminist triumph! (Walkerdine et al., 2001, p.175)

These tensions are particularly pronounced in the case of mathematics because of its key role in producing rational subjects and the gendered ways that it is constructed as absolute and abstract and so as dis-embodied and dis-connected.

Conclusions

This paper has been concerned with seeing how far post-structuralist perspectives on choices, gender and ‘identity’ take us in making sense of gendered patterns of participation in mathematics. Gender is a project that is achieved in interaction with others and opting into or out of mathematics is part of this project. The application of this approach in the stories of Toni, Claudia, and others of my research participants, has resulted in coming to understand certain discourses about mathematics and mathematicians as central to the way that students negotiate a relationship with the subject. Mathematics is different from other subjects; it is certain, challenging, hard, and unrelated to everyday life. Mathematicians are different from other
people; they combine the flattering character of geniuses and heroes with the unflattering character of nerds. These discourses are oppositional and gendered; they inscribe mathematics as masculine. Thus, those doing mathematics are doing masculinity, and so it is more difficult for girls and women to feel comfortable with mathematics, and so to succeed at and choose it.

Therefore I have broken with the dominant pattern of research in gender and mathematics education, and in the sociology of gender more generally, that maps masculinities onto men and boys and femininities onto women and girls (Halberstam, 1998) and so tacitly reinforces oppositional conceptions of gender. That people whose bodies are socially marked as feminine do things that are socially marked as masculine and vice versa is not surprising. However, that the marking of the body as male or female impacts on one’s possibilities for acting, is apparent; not all positions are equally available to all people. Access to the available gendered subject positions is also cross-cut by differences of class, race/ethnicity, dis/ability and hetero/sexuality. Given the generally greater social valuation of facets of masculinity, it is not surprising that these hold out greater appeal for boys and girls than do facets of femininity. This has social justice implications. The analyses in this paper suggest that making a wider range of subjectivities available to a wider range of individuals would be a way of tackling educational inequity. I end with a brief look at the implications of this for gender and for mathematics reform work.

In a rare study of female masculinity Halberstam (1998) points out that, while it may be easier to be a tomboy than a sissy, this does not carry through into adulthood. She argues that, while “excessive conventional femininity often associated with female heterosexuality can be bad for your health” and “tends to be associated with passivity and inactivity, [and] with various forms of unhealthy body manipulations from anorexia to high-heeled shoes” (p.268), it is masculinity that is commonly viewed as dangerous for women and girls. There is a need “to make masculinity safe” for us:

Although it seems counter-intuitive to suggest that such a project should be necessary in the 1990s, it has been my contention that despite at least two decades of sustained feminist and queer attacks on the notion of natural gender, we still believe that masculinity in girls and women is abhorrent and pathological. (ibid.)

However, femininity and masculinity are not two symmetric sets of practices from which people should be enabled to select at will. Current gender regimes are profoundly unequal and men still secure their “patriarchal dividend” (Connell, 1995). I see the project of making masculinity safe for women (and femininity safe for men) as a way of transforming the practices and ways of being that currently support the oppression of women. After all, it is the exclusion of women (and men) from certain practices that allows them to function as part of a system of domination.

If doing mathematics is doing masculinity then this implicates mathematical practices in preserving male domination. The starting point for change must be the myth of the certainty of mathematical knowledge, its epistemological status as absolute and untainted by the corruption and messiness of daily life. This gives mathematics its power and maintains it in its position as the ultimate intelligence test. The two metaphors of voice and narrative are useful for this purpose. By basing my analysis around students’ voices and stories the ‘objective’ voice of mathematics has been put in its place so that other voices can be heard. It is important to avoid essentialism here; there are no true voices. However, the idea of ‘voice’ is still useful. It enables me to acknowledge that we feel able to express some things in some places but not in others and that some of these processes feel authentic while some feel like silencing, and that these processes impact on what we can do in different spaces.

Hearing voices is not a neutral process. As the analytic work here illustrates, it matters into which stories we insert the words we hear. Bibby (2001, p.27) argues that “school mathematics still lacks stories” and asks: “Is this one reason why some of us have such trouble understanding and relating to it?” I both agree and disagree with this. I disagree because, as this
paper illustrates, there are stories about mathematics; to make meaning in any field, including mathematics, is to tell stories. I agree in the sense that these stories are of a very particular kind and are ones that create limited spaces for learners (and teachers). Mathematical pedagogies should actively work to embrace a wider range of stories. Many others have called for similar changes to mathematics (for example: Boaler, 2002; Burton, 1996; Cotton, 2001; Skovsmose, 1994). My work supports their arguments that this would be a more inclusive and socially just mathematics curriculum than the current one. One in which more students than at present could come to think of themselves as what Povey (1997, p.332) calls author/ities in relation to mathematics:

An author is one who brings things into being. Who is the originator of any action or state of things. Authority is concerned with power and the validity of knowledge. Linked together they lead us to the construction of an epistemology which recognises each of us as the originator of knowledge.

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