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Disordering mathematical identity stories through dramatic filmed parody

‘Math Therapy’

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ABSTRACT: The stereotypical mathematical identity story of the ‘mad mathematician’ (consumed by mathematics and socially inept) is widely reported as problematic to understanding what it means to be mathematical, and to engaging students in mathematics. This problem is explored in the improvisational parody ‘*Math Therapy*’, which occurred during my filming of ‘*Performatics*’ (<https://vimeo.com/147449932>); an Arts Based Research (ABR), using filmed-drama. ‘Performed’ and informed by the lived experiences of three post graduate students studying courses with mathematical content, their mathematical experiences are juxtaposed with those of a socially imagined ‘mad mathematician’ in a fictional, generic therapy context entitled ‘*Math Therapy*’. The ABR facilitated a performance of embodied ways of imagining and performing mathematical identity; subverting, making ridiculous, and disordering the stereotypical ‘mad mathematician’ identity, so as to critically question and challenge its authority. Through the performance, the mathematical identities available to us are also revealed as a parody; between the imagined identity and lived experience.

Keywords: Parody, Drama, Film, Identity, Mathematics Education

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Prelude: Finding identity and wisdom through the arts

In this paper, you will be invited to watch my research film about mathematical identity and maths anxiety - '*Performatics*'. Specific attention is paid to the final scene, entitled '*Math Therapy*'. But first: a prelude.

'*Performatics*' is foregrounded in UK national, and international, concerns of developing an increasingly numerate population (Hodgen & Marks 2013). Consequently, mathematical performance is more usually equated to academic performance, test performance and the teaching and learning of mathematics in formal educational settings or 'mathematical academic performativity'. However, reducing mathematical performance to narrow concerns of academic performativity does not adequately account for other kinds of performance, such as performing an identity as a certain kind of person –a mathematical person. Historically, pre-occupation with academic performativity had focussed mathematics educational policies away from the role of 'affect' and the growing academic interest in emotions, attitudes and beliefs in mathematics education (McLeod, & Adams 1989; McLeod 1992, 1994).

More recently, mathematical performance is being conceived as how we think, feel, be and 'act' in social contexts; a mathematical performance that is a socially performed mathematical identity (Zan et al. 2006, Grootenboer & Hemmings 2007.) By exploring thinking, feeling and being, space develops to link these mathematical anxieties and negative dispositions with identity (Hannula et al. 2016).

Problematically, an increasing number of UK students disengage from, and experience anxieties about, mathematics; which is viewed by many learners as unimaginative, boring and irrelevant (Sfard & Prusak 2005, Solomon 2009, Gerofsky 2010, Moreau et al. 2010, Gadanidis 2012). Moreover, cultural perceptions story mathematics and mathematicians as:

- (i) Logical; dispassionate; difficult; elitist
- (ii) Geeks; genius; white; middle class; male (Epstein et al. 2010)
- (iii) Deviant and mad (Abott 2015; Doxiadis 2003, 2004; Moreau et al. 2010).

Arguably the perceptions of mathematics and mathematicians have (for some learners) constructed a perceived incompatibility between mathematics and their identity; between mathematics and femininity (Archer et al. 2013), for example. As well as

compounding disengagement from, and anxiety towards, mathematics (Boaler & Greeno 2000, Darragh 2016, Solomon 2016).

Evidently, mathematical identity is increasingly well researched, but it could be argued that what is being researched is not identity but mathematical activity, and affect towards mathematics. Part of the argument of identity researchers is that social psychological approaches do not actually address identity and that the range of approaches in identity research lacks a conceptual coherence (Sfard & Prusak 2005, Darragh 2016). Indeed, Darragh (2016) categorised the various approaches to mathematical identity research, thusly:

- **Participative:** mediated through participating and engaging in social groups. (Solomon et al. 2011, Boaler & Greeno 2000)
- **Narrative/discursive:** something told (Sfard & Pruska 2005, Epstein et al. 2010, Heyd-Metzuyanim 2013)
- **Psychoanalytic:** an emotional experience languaged as difficulty, frustration, struggle and hate; which reveals 'subjectivities' and the personal, psychic, 'investment' in taking one position over another. (Bibby 2002, 2007; Brown, Brown & Bibby 2008)
- **Performative:** Perceiving identity as an act, a performance that may or may not be recognised as desired (Darragh 2016, Solomon 2016)

What these approaches have in common is that identity is in a state of 'being' or rather, 'becoming'. Darragh concludes that performative identity can bring together the varying, yet often overlapping, approaches to mathematical identity research in order to provide the necessary coherence for operationalising identity in research.

Identity is conceived in this paper, and film '*Performatics*', as performative - dramatised, embodied, with felt- emotion and imagination as integral to identity. Paying attention to performing identity stories is argued as productive for understanding disengagement from, and anxiety towards, mathematics. Mathematical identity is performed in this paper through 'aesthetic performance', (artistic, creative, drama, film), whereby;

The Arts make us feel connected to one another and less isolated. Through the arts, we share an emotion and that sharing connects us with each other and we realise we all feel the

same emotions. The arts are our last hope. We find our identity and make it easier and more pleasurable to live and they also give us wisdom...

Arthur Miller – (Arts Council England 2003, p. 6)

A Creative destruction of mathematical identity research

Only a few of us are going to be willing to break our own hearts by trading in the living beauty of imagination for the stark disappointment of words.

-This Is a Story of a Happy Marriage (Ann Patchett 2013)

Before watching ‘*Performatics*’ I am going to take you through the very real issue of legitimising creative practice as research by introducing you (briefly) to the film methods and conveying my struggles representing the film in academic writing; which felt reductive and counter-intuitive - like an undoing of the films artist purpose.

The irksome issue of legitimising creative practices (such as film, drama, music and other kinds of artistic expression/performance) is a critical issue in research (Berkeley et al. 2016, Wood 2016). For example, arguing for the inclusion of film as research Wood writes,

film production process uses ‘affect’ as a form of sensory knowing that can engage with relevant theory and be used to conceive of film-making as a valid form of academic research (Wood 2016, p. 7).

This is not news; visual anthropology has been keyed into performance and film as research since the early days of Margaret Mead, Geoffrey Bateson, Jean Rouch and the like (MacDougall 2006). Where, in visual anthropology, sentences are written in film (Barabantseva and Lawrence 2015). Both Wood and Bell draw attention to the ‘creative destruction’ (Schumpeter 1943) of traditional notions of academic research, whereby innovation mechanism replace outdate modes of production with the new – where old forms of communication (the print academic journal) evolves into new forms (online open access multimedia journals). However, even visual anthropology/ethnography has a limited number of journals publishing films (e.g. *The Journal of Video Ethnography*). Instead, filmmaker researchers are often limited to the extremely expensive and competitive practice of submission to film festivals; festivals which are mix of one off

special events, annual or even less frequent affairs. Thus reducing the opportunity to academically critique such works and elevate their standing as academic texts in their own right. Indeed, Bell (2008) questions how in a state of academia, where it is ‘publish or perish’, creative practices can find an equitable space amongst the traditional?

Clearly, there remains an impasse between creative practice and what counts as academic, publishable knowledge (Wood 2016). For mathematics education and mathematical identity research, this is despite calls to consider the mathematical body in film (De Freitas 2016) and despite old forms of media production being replaced by new and predominant forms of performance and digital media (Gerofsky 2010).

I share Wood and Bell’s befuddlement with the lack of space for creative practices as research and, indeed, I have faced the difficulty of finding a publishable space for my filmic research, the filmed drama entitled ‘*Performatics*’ which I directed, filmed and edited. ‘*Performatics*’ breaks new ground and constitutes a significant contribution to mathematical identity research, advancing emerging performative/narrative approaches by adopting Arts Based Research (ABR) methods (filmed-drama) not commonly utilised in educational research, or currently used so far in mathematics education research. ‘*Performatics*’ is underpinned by principles that artistic endeavour is inherently analytic (Leavy 2015) - a whole research process and an academic endeavour in its own right.

‘*Performatics*’ documents the ‘identity work’ of three postgraduate students (Claire, John and Rob), turned actors (for the purpose of the film). It is intended that the actors are known through the film and, therefore, only limited information about them is provided in this paper. All the actors were students at the University of Manchester studying a range of post graduate level courses with a mathematical component. The four actors were filmed over one academic year as they constructed a drama about their experiences with mathematics.

The final drama scene, which I entitle ‘*Math Therapy*’, is set in the present day and is loosely based on Rob’s recount of mathematics anxiety he experienced at secondary school. Through their own design, the actors decided to draw on the context of a self help group (like the AA) to create a space to play out mathematics as anxiety making and culturally unpalatable –through the discourse of mental health, addiction and

vice. In *Math Therapy* the actors played fictional accounts of themselves by drawing on a shared understanding of popular, stereotypical images of mathematicians as anxious and troubled –the ‘mad mathematician’. These cultural resources enabled the actors to explore their own experiences, in relation to the cultural understandings of mathematics, which produced this parodic ‘skit’. In *Math Therapy*, two distinct ‘mathematicians’ are encountered; the ‘professional mathematician’ (mad, eccentric genius etc.) and the ‘just plain- folks’ (mathematically in/competent). The scene *Math Therapy* focuses on the ‘professional mathematician’ identity, which is held up as desirable in terms of mathematical performance as academic ability, but derided in common cultural stories of what it means to be mathematical.

Methodologically, *Performatics* is a filmed-drama as Arts Based Research (ABR), which is conceived as a whole research process constituting data collection, analysis, discussion and dissemination. The film title *Performatics* underpins a scientific knowing of aesthetic performance (Hunter 2007), with *Performatics* as a verb, indicating a scientific critique of aesthetic performance. The film as research is, therefore, a scientific investigation of the actor's dramatic performance of mathematical identity. A second understanding of ‘Performatics’ is the coming together of dramatic ‘performance’ and ‘mathematics’: ‘perfor - matics’. The purposeful duality of the film title meaning conveys a sense of the scientific inquiry into the performance of mathematical identity - through ABR and performance methodologies.

ABR is underpinned by principles of ‘aesthetic knowing’, which has two meanings here: Firstly, situated in practice, with an in-the-moment, perceiving, feeling, sensing of a situation linked to hermeneutic phenomenological interpretation of human experience (Ricoeur et al. 1978; Ricoeur 1991, 1992) with identity as dialogic (Bahktin 1986); mediated by others (including the past and possible/imagined selves). The second is aesthetic knowing through experiences of beauty (Leavy 2015), which determines that artistic practices are inherently analytical. Aesthetic creative practices are conceived as useful for exploring embodied aspects of mathematical identity more difficult to capture in purely verbal or written research accounts; such as bodily gestures, memory, inner speech, imagination, thoughts and feelings –the sensing that Wood (2016) ascribes as a particular niche of filmic research. These aesthetic ways of knowing are brought together

to move from practice and the experiential (interviews and observations about mathematical practice) to the presentational and aesthetic (analysing mathematical practice through ABR as a filmed drama) in a creative practice. Through '*Performatics*' the actors became aesthetic objects, thus linking situatedness with embodiedness.

There is an additional link between situated and embodied ways of aesthetic knowing, which relates directly to the title of this paper and the '*Math Therapy*' scene. Carper's (1978) aesthetic knowledge was originally a phenomenological understanding of medical caring practices tied to patient/carer wellbeing and the emotions and intimacy of therapeutic relationships, where medical practitioner and patient knowledge was embedded in experience and practice. The aesthetic method of drama as research, whilst not primarily a therapeutic endeavor in this thesis, shares with psychodrama and drama therapy (Moreno 1953, 1964) the possibility of reflective practice; wherein the film actors come to an understanding of the self. However, Moreno's approach is not central to '*Performatics*'. Rather, I adopt Jean Rouch's filmic psychodrama methods. Rouch was a prolific French anthropological film maker and his career, which began in the early 1940's, spanned some sixty years. Rouch was particularly influenced by the emergence of surrealism and the blurring of the lines between fantasy and reality. Rather than a purely factual observational cinema Rouch purposefully blurred the lines between fiction and documentary through the use of (i) 'ethnofiction' as the acting out of improvisational scene by the research subjects and (ii) 'cinema-verite' (or cinema as truth) as an observational camera approach to unveil the hidden behind and pose the problem of truth and reality (Morin 1985, Morin & Rouch 2003), casting the filmmaker as a provocateur in his films such as '*Moi, un noir*' (1958), '*Chronicle of a Summer*' (1960) and '*Jaguar*' (1967). The observational filmic aspect of '*Performatics*' was based on Rouch's filmmaking principles and framework that film is an analytic and conceptual discussion documented through the filmmaker's frame of reference (Henley 2004) - which is but one of many possible artistic interpretations. Rouch claims that through film, audiences are invited into the meaning making process. Therefore, the audience, who watch '*Performatics*', are also invited to make meaning of '*Performatics*' - as research.

'*Performatics*' filmed-drama as a whole, analytical research process



The drama construction process was filmed in the style of Jean Rouch's observational cinema, accounting for past experience and the actor's imagination (dream like scenes of past experience) as part of their identity, which is evident in the fictional characterisation of mathematicians in the drama parody. The drama method of this research was based on 'Playbuilding' (Norris 2000), which structured the drama process in order to provoke the actors into compiling and constructing scenes about their experiences with mathematics. Initially, the actors were filmed giving testimony about their mathematical learning experiences. This footage was then used as a 'provocation'; shown to the group in order to generate ideas and identify the drama to be performed (their mathematical identity story). Through this dramatic process the actors made sense of, analysed and interpreted their drama as data, in not a dissimilar way to the production of other qualitative research methods.

'*Performatives*', as research, supplements knowledge in the field of mathematical identity research by claiming that (i) there are features of dramatic methodology and film that can be adopted from other fields (observational cinema and theatre studies) to show

the intangible, inner aspect of identity. Features that include a wider grasp of emotions and cultural semiotics, and a means to represent past experience in the non-discursive ways that the storyteller may recall them, (ii) In doing so the affective property of story becomes more apparent and (iii) the audience becomes witness to the dynamism of storying in a way not possible in a written text.

The film has engaged an international audience of over 400 general public, government members, policy advisors, business leaders, educators and academics through its various distribution methods.

Film screening to a live audience

- ‘Pint of Science’ (2015) - International public engagement with research festival. Public and academic audience. Sell out show.
- ‘British Society for Research and Learning in Mathematics’ (2016) – Academic conference.
- ‘Festival of Identities’ (2016) – Conference by the Skills Funding Agency and the Learning and Works Institute. Academic, policy, government (Dept BIS) business and educator audience. This session was also live streamed online and a posted by the conference to YouTube and live stream <http://livestream.com/L4L/ident>
- ‘Methods at Manchester’ (2016) – Research methods academic conference.

Film distribution via social media

- Vimeo - *Performatics* is available on Vimeo’s online video streaming service on the link provided with this thesis.
- Twitter - via the Vimeo link
- Facebook - https://www.facebook.com/performaticalidentity/?ref=br_rs

‘*Performatics*’ is available generally via the distribution methods listed. The film was made as an Arts Based Research process (generating, analysing and presenting academic research) but also as a means to have an appeal to a wider audience, beyond academic. The film was intended to provoke a watching audience and invite them into the sense making process of understanding mathematical identity - through the watching. The

audience is privy to my sensibilities as a filmmaker and my epistemological position that filmed-drama (as research) can provide an alternative sensing of mathematical identity through aesthetic knowing. Drawing on the practice and epistemology of ABR there is no meta-narrative analysis or framework of analysis in a traditional sense. The robust ABR methodology is considered the analytical practice and, therefore, the film, rather than my later discussion, is considered the analysis of mathematical identity. My later discussion of '*Math Therapy*' is akin to the actors/filmmakers studio, where the actors/filmmaker discusses their thoughts about the film, in relation to the film context. In this case, I will make use of the current mathematical identity literature, rather than an analytical framework as a lens to discuss the film. The film, intended as a cultural production in its own right can be judged by the watching audience, without reference to written materials, as a way to know the actors through the beauty of the film and attention to the filmic craft.

With this creative, visual, visceral process in mind, I have experienced struggles and acknowledge an unhappy marriage between my filmed-drama as research (*Performatics*) and then writing about it. For my part, the main premise of '*Performatics*' was the judiciousness of the filmed-drama to represent rich data and to come to an alternative sensing of mathematical identity, which differs from written accounts. As a consequence, writing about '*Performatics*' has been brutal, and often bruising, because of a disconnect between the principles of creative practice as research and the crafting of academic writing. As an 'artist' it felt uncomfortable and counter-intuitive to 'justify' the work beyond the artefact produced. To explain the art feels like an undoing of its purpose. However, in this paper, some sense of the value of '*Performatics*' in understanding mathematical identity, is conveyed by discussing the drama parody scene '*Math Therapy*'. In doing so I carve a space where words and imagination share a more equitable space; writing the imagination through filmed-drama and then drawing attention to the filmed drama's value as research.

Before engaging with my interpretation of what the film offers for mathematical identity research, I firstly direct you to watch '*Performatics*' now, for the film was intended to stand in its own right, as a depiction of the performers identity but also as a

means of provocation, to generate further thinking and appreciate the audience contribution and development of their own understanding.

Please follow the link: <https://vimeo.com/147449932>

After the watching; some discussion: Parody as a means of exploring mathematical identity story.

This section details how drama parody was used as both a conceptual and methodological tool for exploring, and sensing, mathematical identity. Firstly, I detail my conceptualisation of parody before moving on to the methodological application of parody in an Arts Based Research (ABR) filmed drama '*Performatics*'

I draw on the work of Holland, Lachicotte, Skinner and Cain (1998) in order to understand how the research participant students, as actors in '*Performatics*', used the popular media and common, stereotypical notions of mathematicians as cultural resources to mediate their mathematical identity and to also construct the drama. I clarify how the body (in parody), is fundamental to storying mathematical identity. Wherein the body read as a sign becomes integral to the tellability and dramatic intent of a mathematical identity story. This claim is elucidated through engagement with literature which describes the gendering of the mathematical body, the embodiment of cognition, and the dramatic/narrative function of the body. More specifically, for the '*Math Therapy*' scene, how narrative functions make for particularly tellable stories where the mathematical body is read as mental illness, as substance misuse and finally, sexualised.

Some sense is given here to how parody is conceived in this paper as a conceptual and methodological tool in the drama. Bakhtin's explanation of his understanding of the use of parody provides a sense of speaking through the voices of social others, how parody is a means to ventriloquate actors with the voices of others and how parody can be meaningful but also superficial.

Analogous to parodistic discourse is ironic, or any other double-voiced, use of someone else's words; in those instances too another's discourse is used for conveying aspirations that are hostile to it...one speaker very often literally repeats the statement of the other speaker, investing it with new value and accenting it in his own way—with expressions of

doubt, indignation, irony, mockery, ridicule, and the like. ...One can parody another person's style as a style; one can parody another's socially typical or individually characterological manner...one can parody merely superficial verbal forms, but one can also parody the very deepest principles governing another's discourse (Bakhtin 1981, p. 194).

Parody, as a distinct narrative form, has its own function and purpose to present dissenting voices; a means to subvert the teller's original meaning, thus having the agentic potential to free the actor somewhat from the ventriloquation of others or of the wider social discourse. Voloshinov articulates how parody has the purpose "of focusing on the 'referential object of speech, as in ordinary discourse, and simultaneously at a second context'" (Voloshinov 1986, p. 196).

That is; speech refers to wider social discourse, operating on two levels. Hutcheon (1989) tells how parody references history and a tension in the changing of old forms of expression, into new; it subverts the iconic. For example, parody is a way to translate experience which exists simultaneously where comedy and tragedy exist "*from the beginning, as two sides of the same coin, as the two aspects of dialogue* (Kleberg 1991, p. 101). Parody exemplifies the duality of speech; the words of the speaker and a reference to wider discourses and speech across time for dramatic effect and to reference tensions. For example, Solomon (2016) presents us with interview data where the subject describes her experiences with mathematics in a form of parodic speech, or 'Skaz voice', which dramatically narrate the voices of her family members who were complicit in her identity storying.

These dramatic ways of parodying speech also tie into other dramatic ways of storying identity, whereby parody is not solely a discursive practice.

In their book '*Identity and Agency in Cultural Worlds*' (Holland et al. 1998) Holland et al. go beyond the discursive to consider identity narrative as being bodily performed through "*Dialects, genres, styles of dress, ways of holding and moving the body*" (Holland et al. 1998, p. 235), and present two such cases through chapters on *Alcoholics Anonymous (AA)* and *Mental Disorder*, which discuss the body as having a narrative function - with which one can read, and mediate identity. Holland et al.'s exposition of the medicalised view of addiction as a 'disease', illness or malady, made

apparent by an observable set of ‘made up’ behaviours (Holland et al. 1998, p. 69), describes how the psychiatric classification of mental disorder is derived from a phenomenological, descriptive system where disorders are categorised according to observed sets of symptoms or syndromes that are different to what is designated as normal behaviours (Holland et al. 1998, p. 198). Whilst psychology maintains that patients are distinct from their illness, patients are most often identified by their diagnosis. Thus, the words of the psychiatrised identifications become semiotic devices and the body becomes a sign through which personal stories are voiced (Goffman 1961; Butler 1990, 1993; Langellier 1989). Usefully, for this paper, Holland et al.’s example of addiction and mental illness facilitates an understanding of how mathematical identity can be similarly read. For it is claimed mathematicians’ lives are read through their mathematics as though it is their identity (Mendick et al. 2010, p. 5) and images of mathematicians (as mad, obsessional, genius) are ingrained in the media and public consciousness (Doxiadis 2003, Andreasen 2014, Gadanidis 2012, Mendick et al. 2010 p. 4). For example, mathematicians depicted in theatre and films are often portrayed for the dramatic elements such as their struggle against, and obsession with, the mathematical problem as well as struggles with poor mental health and personal and social relationships (Doxiadis 2003, 2004; Gadanidis 2012; Mendick et al. 2010; Abbot 2015). Mathematics as obsession further alludes to a vice or addiction, which, through Holland et al.’s understanding is conceived as mental illness.

Doxiadis (2003) claims these conflicts are dramatic and entertaining because of the inherent paradox and dichotomy between the commonly held views of mathematics and mathematicians as both rational and irrational (mentally disturbed). This, Doxiadis claims, makes dismal stories about mathematics and mathematicians particularly compelling, tellable, reproducible, and therefore durable.

This image of mathematics and mathematicians also necessarily refers to how the body is read as mathematical and what a mathematical body might look, move and be like. For example, the unattractive, socially inept, geek identity and more recent iterations which draw on the general trend of the sexualisation of the body in the media, which has resulted in mathematicians being increasingly depicted (particularly in the mathematics

game show genre) as highly attractive and sexualized; known for the body rather than mind (Paasonen et al. 2007, Redfern & Aune 2010, Allen & Mendick 2013).

In summary, the storying of mathematics and mathematicians is discursively and bodily expressed and narrated. Understanding the dramatic function of the mathematical body, and how it is represented culturally in the media, is an important foregrounding for understanding some of the media representations which the actors explicitly draw on, or allude to, in their performance of *'Math Therapy'*.

Math Therapy: An example of filmed drama parody

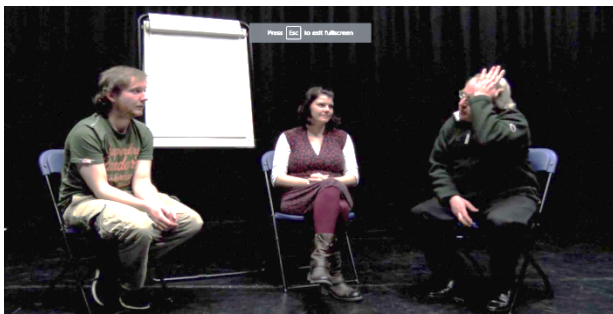
The section moves on to discussing the filmed scene *'Math Therapy'*, and how the stories of mathematical identity can be understood in the drama parody. For the purposes of the discussion, *'Math Therapy'* has been broken down into smaller scenes in order to relate the discussion to the various therapies the actors' parody; *'mental health'*, *'substance abuse'* and *'sex therapy'*. Each section opens with the film clip in question and some discussion follows. Where the paper references the film as a clip, a script is also provided. The reading/watching audience is guided to each clip which is indicated by a thumbnail screenshot and timecode which indicates where in the film the clip is located.

To view the clip scroll through the film until the time indicated. A reminder that to watch the film you can follow the link to *'Performatives'* <https://vimeo.com/147449932>

Mental health therapy

The clip on mental health begins with an account of how the mathematical body might be conceived and how we understand what a mathematician might be like from their bodily performance; imagining how mathematicians might think, be and act – differently/abnormally. This section on mental health discusses how, in the parody, the actors use their bodies to narrate, make ridiculous, and therefore challenge (somewhat uncomfortably), common stories of the mentally unstable mathematician.

Mental health: Timecode 18m 8s



John Claire Rob

Rob: Maths anxieties, I have many of them, maths anxieties. [odd walk and voice] ...This is my first time here [high pitched voice, holds head]. Yeah, I've been referred by my psychiatrist.

'Math Therapy' opens in the drama rehearsal with Rob (on the right) dramatically recounting a personal story about his anxieties of needing to "get good" at mathematics. The film then moves forward in time to the theatre space, where Rob's earlier rehearsal is being worked into a more completed drama. In crafting the completed drama scene Claire (central) proposes to improvise a scene about mathematics anxiety. The improvisation, whilst based on personal accounts, was largely unplanned and unscripted and given only a few moments thought as to a general theme and bricolage of personal and general ideas about mathematics, which developed some ideas about mathematicians as mentally ill and a need for therapy; *'Math Therapy'* was conceived. Whilst the actors played 'themselves', using their own names, and drew on personal experience of mathematics, overall, these were caricatures played out in the subjunctive mood (Schechner 1985) of playing oneself beside themselves. The actors played alternative versions of self. The anxiety theme is brought into the present day rather than recounting specific personal and historical experiences with mathematics. The anxiety theme of mathematical experience is re-visited through *'Math Therapy'*, a confessional self-help group for mathematicians. Whilst not intentional, the therapy session framed the behaviours and language of the actors around that context and they spoke of mathematics in a therapy 'genre', parodying various mathematics anxieties and stereotypes of mathematicians for their perceived ridiculousness. Additionally, the therapy session, as a confessional space, spoke to

concerns about mathematics as something invisible and an aspect of identity to be kept hidden.

The therapy begins with mental wellbeing and the use of psychiatry for overcoming anxiety towards mathematics. Two sides of the mathematics anxiety coin are played out and mirrored in Rob's performance. Firstly, Rob's past school self (in the rehearsal) has anxieties about getting good at mathematics. In comparison, present-day Rob in the crafted theatre performance has got good at mathematics and now plays a caricature/ stereotype of a 'professional mathematician' (the tortured genius, crazy mathematician) who has anxiety because he is good at mathematics. Rob's strange walk, high pitched voice and head holding indicate how mathematics has made him mad, parodying the stereotypical images of the mad mathematician. Whilst Mendick (2006) asserts that doing mathematics is doing masculinity, she also underlines how there are many masculinities, some of which are in tension with being mathematical and geek or boffin identities. The male body, as an object, can symbolise intellect but it is often depicted in media as fragile and socially inept (Mendick et al. 2010). These peculiarities of mathematical masculinity often manifest in media and social discourse as mental illness, personality disorders and the like (Doxiadis 2004, Gadanidis 2012, Moreau et al. 2010).

In summary, 'Mathematicians' as a distinct kind of biological entity translates to how mathematicians are construed in the popular media as physically performing themselves in unusual ways (the strange talk, bodily ticks etc.). The filmed drama provided an alternative means to sense mathematical bodies, beyond a simple stereotype and to consider the body as having a dramatic, narrative function. Using their bodies, the performers narrated distinct kinds of performances about mathematicians based on an imaginary yet common allusion of a mathematical character. In doing so this caricature of the mathematician was brought to life and made ridiculous by the actors. By ridiculing common conceptions about what they, the actors, must be like as mathematicians the stereotype is of the mathematician takes on a personal resonance. The character of the mathematician moves from this ethereal caricature and is grounded in the reality of the experience of the actors. Thus the senses and notions of what is publically understood

about the mathematician are confronted, sometime uncomfortably, by the actors lived reality.

Substance abuse

The scene moves on to drug and alcohol therapy and the language of addiction. Mathematics is re-framed as an addictive drug which opens one's eyes to another kind of reality; a different way of seeing things - mathematically.

Substance abuse: Timecode 24m19s



John Claire Rob

John: Have you tried ignoring it? Living life without maths?

Rob: You can't live life without maths, unfortunately. It's in everything, It's everywhere, you can't get away from it.

Claire: So how do you live a normal life [open arms gesture/questioning]
If you're addicted to maths?
[...]

Claire: [looking to John] So when did your issues with maths begin?

John: I think was whenever I realised that it was everywhere and you couldn't escape it. And I've been trying to escape it ever since.

Claire: So have you found any methods to...keep it in, keep it in check?

John: Well there was the alcohol and the drugs but then I have to go to AA and now I'm back here...

Rob: Yeah I don't find replacing one addiction with another helps

During this exchange, the three actors remain partially ventriloquated by social voices that doing mathematics is something to be ashamed of and to distance yourself from;

echoing the negative perceptions of being mathematical and a boffin/geek/genius (Epstein et al. 2010, Pomeroy 2015). However, in this clip John and Rob are able to see the humour in wider social stories; parodying the notion that mathematicians can only be read through their mathematics (Mendick et al. 2010) by appearing to be thoroughly obsessed with mathematics.

In reality, mathematics (as a subject) is not really troubling for John and Rob. Rather they are performing a parody of how those with a wider knowledge of mathematics are privileged to be able to see and use mathematics. In contrast, Claire, who has positioned herself as someone not good at mathematics, is limited in her contribution to the improvisation and takes on a facilitating role as a questioner in the confessional of John and Rob. Claire asks many questions of John and Rob: “*How do you live a normal life?*”, “*when did your issues with maths begin?*” Claire re-asserts the mad mathematician image of mathematicians being abnormal in some way.

Claire also questions John about his self-control and how he ‘uses’ mathematics. This addiction metaphor of ‘using’ mathematics was useful for John and Rob to display their mathematical prowess (voicing all the ways they use mathematics) whilst still holding to the premise that the use of mathematics is somehow undesirable. What Holland et al. (1998) do for this reading is to highlight the phenomenological descriptive systems, which describe certain kinds of bodies and aligns those bodies or behaviours with certain kinds of people. Mathematics as within in the body; as addiction, as mental illness, subjects mathematicians to common stereotypes of the addict and how then mathematicians should look and act; thus underscoring an abnormality of mathematics.

Through the parody, the actors re-imagine their own experiences and critique common stories about mathematicians. With limited pause-for- thought, the parodic improvisation is less affected by the potential filtering of uncomfortable expressions of identity, expressing a less fettered emotional content and allowing space even for the more uncomfortably prejudice characterisations of mathematicians that a more thoughtfully reflective method (scripted drama, interviews, observations) might have filtered out. For example, the expression of mathematical Tourette’s as mathematical-expletives; a form of mathematical madness. Of course, the characterisation of mental illness is as much affected by prejudice and dismal social stereotypes and these accounts

are not credited to the actor's but rather the cultural, media images of both mathematics and also mental illness on which they draw to construct the drama.

It could be claimed that in the parodic improvisation the actors are less able to filter, censor and sanitise their performances because of the limited time and space to tailor the performance to suit the audience. Thus the performances delivered here are making uncomfortable common images of mathematicians, and also mental illness, so as to challenge them.

Sex therapy

The final therapy is sex therapy. Sex becomes a metaphor within a comic framing of innuendo and double entendre to enlighten the gendering of being mathematical. Rather than play down issues about the gendering of mathematical identity, this discussion highlights how the frivolity of innuendo and double entendre quite powerfully draws attention to these difficulties and uneasy parallels are made between the actors' personal experiences, and wider societal stories, about the gendering of mathematics.

This final scene begins with double entendre in an exchange about the use of mathematical tools and moves on to discussing the attractiveness of the female presenter of the TV mathematical quiz show 'Countdown'. The accompanying text is selected from an exchange which takes place over the course of a few minutes which is distilled here for the purposes of exploring the scene.

Sex therapy: Timecode 25m50s



John Claire Rob

Claire: [whispering] Do you ever use a calculator?

John: [long pause, furtive glances to each side] Do you want me to get it out?

Rob: [excited voice, smiling] Yeah show us your calculator.

Group: laughs...

John: It's quite big!

Claire: I imagine it would be!

Claire: Who's your favourite mathematician?

Claire: I'm more of a Carol Vorderman person myself

John: Her replacements pretty good

Rob: I like Rachel Riley's legs I have to say

Claire: Well she has two of them

John: Two is about as much as I can handle

The scene has many layers but first and foremost the conversations of a sexual nature would more often be regarded as salacious or scandalous; indicated by Claire's whispered opening gambit "*do you ever use a calculator?*" The calculator is inferred (indirectly through jeers, glances and laughter) as a phallic symbol; a rude, salacious joke that the group begin to laugh along with. It is a common parody to use derision and comedy to make a serious point about the social world. Here the sexual innuendos between prized objects or belongings as a symbolic extension or expression of manhood and male sexuality is such a parodic derision of mathematics being male, so male that mathematical objects allude to the male anatomy. The group joins in the innuendo and the body language of laughs, smiles and knowing glances draws the performers and audience deeper into the joke; deeper into the scandal. The irony of this joke is that whilst the performers parody mathematics as something as sexy and desirable, mathematics is very rarely discussed as desired or an attractive proposition.

At this point in history, sexual desirability is entering the public consciousness as a way to engage women in mathematics and also into popular culture as the popular media increasingly look to attractive viewing content (Archer et al. 2013, Betz & Sekaquaptewa 2012). Whilst in the UK we have Carol Vorderman as the uber feminine TV quiz show mathematician (Mendick et al. 2008), other international examples highlighted by Betz and Sekaquaptewa (2012) include the American actress/mathematician Danica McKellar and even Scientific/mathematical iterations of Barbie. Seemingly, the possible mathematical identities are becoming increasingly contradictory, and whilst well intentioned, problematically, the actor's performance in

'Math Therapy' demonstrates how female mathematicians, as attractive and desirable, might then be objectified for their bodies rather than appreciated for their mathematical ability.

Discussions about mathematics and sex are not usually the stuff of research data. However, in a dramatic parody, with the proclivity towards fiction and fantasy, such conversations can be had. The parody, mirrors two senses of the same issue, two simultaneously existing ideas, and two sides of the same coin (Voloshinov 1986, Kleberg 1991). Through scandalous speak, the scandalous notion of the abnormal mathematical body and female gender inequality in mathematics education and careers are exposed publically.

Conclusion

In conclusion, I claim dramatic parody is a powerful means for researchers to understand the body as a site of narrating mathematical identity. The actor's fictional caricature of themselves in the parody of *'Math Therapy'* is a means to directly position their personal experiences amongst the social stories of what it means to be mathematical. The ABR methodology employed addresses concerns of disengagement from mathematics, where being mathematical has been storied as socially undesirable and unpalatable. The therapy setting became a performative convention to imagine the socially constructed image of the mathematician and consider this image in concert with the lived reality of the actors; as mathematicians, and people. The actor's use of the convention of medicalised madness (as an addiction) locates the actors in a confessional space and the drama shifts to almost parodying the therapeutic context in which it is set; the drama itself becomes therapeutic for the actors to exercise experiences of being mathematical - or not.

What I claim is being done by the Parody in *'Math Therapy'* is the contribution of a subversive take on common images and stories about mathematics and mathematicians. The mathematical body, as depicted in popular media images, becomes ridiculous and we see the mathematical body for what it is - an entertaining story. The function of parody in theatre, as a potentially creative and subversive medium, shows that once we can understand that the body has a dramatic and entertaining intent, we can begin to separate the imagined mad mathematician caricature from the lived reality of the mathematician.

The mathematical identities available to us are therefore appreciated as parody, a subversion of the lived reality of being mathematical. Acknowledging parodic mathematical identities is important if we are to imagine other, alternative possibilities, and undertake a creative destruction of identities gone before.

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