A CONTEMPORARY THEORY OF MATHEMATICS EDUCATION RESEARCH: A NEW BOOK[1]

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Mathematical ideas have become very familiar to us as compulsory elements of most people's education but more generally within everyday life. The acquisition of mathematical ideas and processes is often experienced as a formal demand to ensure that the acquisition of certain mathematical ideas in prescribed forms has taken place, with suitable checks and balances to measure this acquisition. But the original desires for including mathematical ideas in our everyday lives appear to have been rewritten to meet specific contemporary caricatures of mathematics and the supposed world that it now serves. In recent years, some of these caricatures have ostensibly been produced to facilitate the obsessive "audit culture" that emerged in the 1990s where everything needed to be measured and compared (Strathern, 2000). Consequentially, the formal task of teaching has been increasingly recast as the "delivery" of so many commodities according to preferred metrics. But what is the collateral concealed in the forms of mathematics crafted as commodities in this way? What is delivered, as might arrive in a supermarket delivery van, and what damage is done by the plastic wrapping that we barely noticed until our seas filled with plastic and we feared that it was a potential vector for Covid-19? That is, what is embedded in the materials and practices through which people encounter what is called, "mathematics" today? The dominant commodity forms in mathematics education govern both our practices and our analyses of those practices and risk displacing mathematics as a living response to everyday challenges. Our very construction of mathematics is the flip side of our construction of ourselves, where these dual constructions are both compatible with certain modes of practice preferred by the models of governance to which we are subject. Mathematical ideas then are not so much tangible entities to behold but rather specific manifestations of human experience that require a specific mode of human to experience them.

The consideration of wider theoretical resources that might be used within mathematics education research is in some ways prompted by the way in which the field of mathematics education relates awkwardly to its two constituent terms. Mathematics and education wave tenuously to each other from disparate conceptual domains. Mathematics is considered by many as a discipline beyond social discourses. Underlying this understanding is a philosophical position that seems to assert the objectivity of mathematics as a prized possession. This kind of grounding has the effect of conceptualising mathematics as constituted by pre-existing patterns that are stable and can be discovered. In this view, it is possible to know what is and what is not true since knowledge is objective and universal. In some versions of this formulation, the reality of mathematics has the same qualities regardless of observer and context. Philosophies of mathematics centred in positivistic

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notions of mathematical truth, objectivity and stable meaning are not especially disposed to the familiar philosophical bases of education. Nor do they resonate well with the more nuanced *linguistic turn* privileged in all three mainstream philosophical traditions of the later part of the century: hermeneutics, analytic philosophy and postmodernism. Truth, insofar as it is entertained in these philosophies, is processed through language where knowledge emerges through the operation of discursive systems often without centres. As such, knowledge houses tendencies that are not always in the business of portraying a world defined by consensual harmony in which final answers might be available. Research, in these contemporary traditions, is more centred on generating alternative analytical filters according to diverse priorities rather than supposing that a best solution could be achieved. Here, mathematics is fit to purpose, analytical structures would be imposed *on* life to make life different, rather than being discovered *in* life that goes on much the same after the discovery.

Education is notionally a social science susceptible to interpretive analysis. Social science brings to the fore the complexity of the social world and that vantage point prompts the notion that people are constantly making sense of their worlds. Realities are local, specific, and constructed, and, hence, values are an integral component in the meaning systems that people generate in social action. Truth, then, is not absolute and certain but is socially and experientially based, embedded in fluid social interactions. From this specific sensibility towards knowledge construction comes the understanding that the social world can only be investigated through a systematic analysis of socially meaningful action. Education, however, frequently resists conceptual immersion in the broader social sciences and the analytical resources those sciences provide since, as both idea and practice, it finds itself increasingly susceptible to external definitions and overt and covert regulation. Curriculum decision making is split and shared unevenly between various groups that do not necessarily see eye to eye. Their differences result in disjunctions (both real and potential) between mathematics education policy setting, curriculum implementation by teachers and the conceptualisations of mathematics education by researchers. The resolution of these conflicts has resulted in an enforced homogenisation of pedagogical practices together with demands for increased testing. Research then needs to decide which side it is on, whether it is supportive of specific political agendas or resistant to those agendas, perhaps in pursuit of more intellectual ambitions, but then who would such intellectual ambitions serve? For example, is mathematics education research designed to support institutionalised conceptions of mathematics predicated on prescribed targets, or is it about taking a more critical approach to such prescription with view to opening new trajectories, such as seeing education in much broader terms, thereby challenging more the familiar framings that characterise the common sense of the day. Any answer to such a question is far from clear cut. Institutionalised conceptions of mathematics are often created towards supporting agenda of inclusion, but that very inclusion may temper the aspirations of those wanting to pursue a more individual or eccentric path.

Restrictive conceptions of mathematics and of education, like these, mean that the composite term “mathematics education” is held in place by a variety of culturally bound assumptions. Largely circumscribed by something bigger than itself, mathematics education is constituted through dense webs of power. Traces of the determining effects of power are apparent in any mathematics education community of practice. A dilemma presents itself to those involved directly with those communities: Do we conceptualise our task in terms of initiating our students into existing knowledges? Or, might our task be seen, more radically,

as troubling the limits of those knowledges, with a view towards keeping open the prospect of our students accessing a truth that transcends the parameters of our own teaching since the world that they are entering is one that we do not know ourselves? In other words, is it possible for students to reach beyond the frameworks that their teachers offer to produce a new future beyond our current vision? The latter option is not to be taken lightly since it requires a major shift in conventional thinking and practice. How do we fashion a new imaginary in which teachers forego a comprehensive understanding of what their students should be able to achieve? Thus, a key question for mathematics education research can be framed in this way: Is it possible to embrace new ontological possibilities for the learner and teacher beyond established states of representation? The intention here would be to open another space for talking about the field in a way that is responsive to the diverse demands it encounters and the multiple contexts that shape its practices.

My new book *A contemporary theory of mathematics education research* seeks to provide a theoretical account of how processes of learning and teaching mathematics create us as particular types of human compatible with prevalent ideologies. Not so much inclusivity for all in the study of mathematics but rather compliance for all. The book speculates on why the mathematical work that precedes each of us motivates us to understand ourselves in the way that we do. But having understood ourselves in given ways how do those self-conceptions then motivate us to construct mathematics in our own actions and pass it on to new generations? The book argues that caricatures, whether of humans or of mathematical ideas, result from contingent aggregations of historically derived elements. In these caricatures, we fix ourselves as "humans" by "counting as one" a certain set of elements (body parts, key locations, years of experience, grade point averages, Facebook 'likes', consumer preferences, etc.). We fix mathematics in much the same way (multiplication tables, iteration processes, graphs) and cross-reference these reductions to each other to the potential exclusion of renewal seen in more nuanced terms. That is, compliance for mathematics and for people in the name of inclusivity according to current agenda with the chosen characteristics sutures new ways of being.

Mathematics as a field of human intellectual endeavour preceded all of us living today. We have learned to believe that mathematics can do a lot of things for us and we trust "it" with our lives. Many of us mundanely rely on it to keep its peace to hold up bridges and buildings for centuries. Just a select few people rely on cutting edge mathematical innovations to enable sophisticated ventures like a short break to the moon. Ultimately, "we believe that it is linked to the fantasy of control over a calculable universe necessary to sustain our present social and political order" (Walkerdine, 1988, cover text). So, mathematics has become an inextricable part of our lives, where strict boundaries between practical and intellectual manifestations of mathematics are difficult to draw. These boundaries are yet harder to discern since pedagogical interventions impose multiple understandings and levels of trust in "real life" models. It is sometimes unclear whether in these attendant pedagogical rituals we are aiming to keep mathematics alive in its responsiveness to new challenges, or rather calcify old versions of life and the forms that it takes in the name of wider circulation today for pedagogical accountability.

Against this supposed backdrop of mathematics always having been there in ways that are familiar, we build an understanding of who we are. But how do we encapsulate who we are against this backdrop, using the paraphernalia of that backdrop as seemingly raw materials in constructing our story of who we are? Freud (2002, p. 5) argues that:

> An adult's sense of self cannot have been the same from the beginning. It must have undergone a process of development. ... Pathology acquaints us with a great many conditions in which the boundary between the ego and the external world becomes uncertain or the borderlines are actually wrongly drawn. There are cases in which parts of a person's body, indeed parts of his mental life – perceptions, thoughts, feelings – seem alien, divorced from the ego, and others in which he attributes to the external world what has clearly arisen in the ego and ought to be recognised by it. Hence, even the sense of self is subject to disturbances, and the limits of the self are not constant.

That is, my sense of self is always rather speculative. Lacan's iconic example of what he calls the Imaginary is that a child looks into a mirror and says, "That's me". But this identification is with an image, or caricature, rather than the real me. What's me, or not me? "The Imaginary is the transformation that takes place in the subject at the formative mirror phase, when it assumes a *discrete* image, which allows it to postulate a series of equivalences, samenesses, identities, between the objects of the surrounding world" (Bhabha, 1994, p. 77). The Lacanian subject is known through the stories in which the subject appears, such as in a psychoanalytic encounter where an analysand depicts aspects of her life through a sequence of spoken words. That is, the focus is on how life is organised as a conglomerate of words or symbols or stories or narratives rather than on a supposition of an *actual* (biological) life to be observed and classified according to key characteristics. The signifier is privileged over signified. The story that is told somehow replaces the life that it sought to describe.

The notion of "one life", "one self" or "one individual", however, is not always quite so distinct. Research has described many examples of children accessing mathematics through computers where the boundary dividing teacher and student is obscured. For example, the teacher function in the educational use of software can be enacted in different ways with different degrees of human teacher input. It is easy to generate many alternative contemporary examples where the nodal boundaries (teacher, student, mathematics, human, machine) are rather less clear, such as between where the human stops and the machine begins: Children sharing an app on an iPad; computers consummating a prearranged date to trade shares as predicted market conditions move into place; Andy Warhol getting confused between the real and the artificial; Lewis Hamilton and Felipe Massa who became renowned for repeatedly driving their cars into each other and blaming the cars; Arnold Schwarzenegger's alter ego terminating one of his adversaries; the absence of centrality in the worldwide web; Stephen Hawking producing equations through his electronic media; or Richard Dawkins and his genes each claiming primacy. The talking and gesturing individual human described by Piaget as an immediately present physical entity is rather less prominent in the landscape of contemporary society with machines or pedagogical apparatus replacing so much of what had previously been more direct human contributions. These *machinic* supplements to human activity have earlier mathematical conceptions built into them, like bionic arms. The assumption of a self in an assertion of saying "that's me" comprises a collation of a set of characteristics, attributes, organs, etc. that make up "me", for now. This set of characteristics is "counted as one" person. Yet there are different ways of constituting "me", different aspects of oneself create the characteristics that make "me". And in these constructions of myself I am using, knowingly or unknowingly, more or fewer of the machine-like supplements that are available to "me". My personal boundaries lack clear definition. And I can never be sure how much "me" integrates forces that I might not support in conscious awareness. Ian McEwan's fictional futuristic character

Adam is a factory made entity who has so many human characteristics that he is unsure whether he "feels" human or not (McEwan, 2019).

Technological advances have resulted in the very infrastructure we inhabit absorbing socialised mathematical framings from earlier era (Bastani, 2019). For example, the widespread personal ownership of smartphones has relocated and redefined the very collectivism of encountering mathematics and the tangible manifestations or nodal points that locate and define mathematics in the popular imaginary. Numeric algorithms are absorbed into sequences of button presses, swipes, etc., while geometric objects are constructed and apprehended according to the processes of digital apparatus, rather than with analogic rulers and compasses. But these digital manipulations conceal design-stage choices in terms of how certain ideas or procedures are incorporated and understood. Pedagogical choices or functional routes have been made within the technology prior to the user pressing any buttons at all. Similarly, the very physical and mental formation of humans themselves is a function of the textualised and mathematical ecology of which they are part, and their choices feed into the big data that characterises new forms of normality. In some countries smartphones provide an excellent means of governmental surveillance, where it can even be decided if someone deserves a holiday.

School mathematics is increasingly viewed as part of the apparatus deployed in responding to political demands for economic and technological development. Schooling in general, and mathematics education is increasingly shaped, funded and judged by its perceived capacity to deliver success in terms of the prescribed quantitative measures by which so many governments reference their ambitions and achievements. Good performance here has sometimes been taken as being indicative of wider economic potential: the policy rhetoric suggests that the more we can improve in those areas the better for our future national well-being. Governments of right and left have been seduced by the appeal of "raising standards" in a statistically defined world, in which standards become a fetish for intellectual life and academic achievement. Measures of school performance developed in various international exercises now often define what education is for or what it should be, policing educational boundaries with ever-greater efficiency. These instruments have transformed the content of what they purported to compare, and similarly threaten to transform the demands on teachers and pupils preparing to meet these newly defined challenges. A key effect is a convergence of the metrics that produce normalcy, equating compliance with specific patterns of achievement with being "good" or "better", or even "outstanding". Policy thus legislates for a specific version of mathematics according to a centralised script, normalising what it is or should be to be a mathematics student and what it is or should be to be a mathematics teacher.

But "improvement" or "maximising" and similar aspirational metaphors for the passage of time can be understood in many ways. Academic motives and ethics for working with children in school such as enjoyment of mathematics, mathematical integrity, and functionality in practical situations do not always pull in the same direction as "improvement" or its metrics. A choice needs to be made as to the sort of mathematical activity that is worth living, and what or who it is for or against. Do we want to invest funds in centres of excellence in learning at the expense of wider inclusion? Should mathematics be promoted at the risk of discriminating against certain students or promoting dominant political agenda? Should mathematical understanding be conflated with functional technology? We might even ask whether functional mathematics and its pedagogy is inhibited by overly-asserted notions of certainty. Further, the *advance* of mathematics is not

always desirable. Often the economic drivers of research in mathematics are not decided by altruistic purpose or ethical priorities. Missiles rely on research into sophisticated mathematical models and that can influence the priorities of government funding in mathematics. Our access to scientific and mathematical phenomena is mediated by multiple foregrounds and is affected by the way in which we apprehend their purpose and accept the challenge of engaging with them as imaginations, possibilities, obstructions, hopes, fears, stereotypes, and preconceptions (Skovsmose, 2016, 2019). Manchester residents Ernest Rutherford and Alan Turing each provided operational levers to ending World War Two through their work in mathematics. Rutherford probably did not predict Hiroshima as an application of his work when he split the atom. Turing's work on breaking codes, however, is credited with shortening the war by two years, by weakening the Nazi naval siege of Britain. We might also add that mathematics is implicated in the on-going financial uncertainties where confidence intervals have sometimes delivered their outliers. Bankers have calculated their bonuses, but not the outcomes of their own actions amidst the seismic sliding. Their sums seem not to work for other people. Ambitions to improve the teaching of mathematics can serve multiple ends, not all worthy of our support. Barwell (2019) investigates how we might conceive of mathematics education in ways that is supportive of the environment, maybe in designing technologies that do not pollute. Ernest (2019a) reviews some of the wider issues relating to the ethics of mathematics.

Contemporary politics is complicated by the disjunction of governmental politics and the real operation of the market, which forces the hand of states to adopt certain forms of policy. We do not elect the people who are really in power. Thus, market conditions can often displace educational principles in setting the terms of educational practices. That is, it can be unclear how a researcher in mathematics education might seek to conceptualise the challenge of researching the field with a view to asserting some instrumental impact. Impacting on policy is not only unlikely, as politicians do not always listen to or connect with mathematics education researchers, but even if they were to be more attentive the impact of any given policy is highly uncertain. However, this macro perspective evades many researchers in mathematics education who focus on their own local situations, without any specified ambition of scaling up for a wider population. The difficulty of scaling up has been the theme of a recent ESM special issue (2019).

A major challenge then is to rethink the breadth of mathematics education in resistance to reductive conceptions of mathematics, and to critique mathematics education conceived of and (re-)created in support of current models of economic production, technology, and political administration, rather than, say, social welfare or epistemic motivations. The political climate has reframed how funded research in mathematics education is conceived, prescribed, evaluated, and so conducted. Market metaphors abound in the language of improvement, with terms like progress, advance, quality, effectiveness, industry, competitiveness, performance, and standards slipping easily off the tongue in much of the contemporary academic discourse. Hence much research is often predicated on *improving* school achievement in standardised terms rather than merely *studying* it and understanding it. Proposals for funding typically must offer victory narratives, making promises of how research outcomes will provide specific understandings of education and so improve it. References to such discourses seem often to shape the activity of aspirational individual researchers. The superlatives used in the construction of these narratives, however, can sometimes disguise the differences between the multiply directed motivations of mathematics education researchers (e.g. for ethical practices, to understand more deeply, to

disrupt or think differently) and the operational motives that guide their actions (e.g. securing funding, getting published, recalibrating practice, working towards a PhD, helping their students, etc.). The requirement that research should reach agreement with politicians and employers across nations might be a further stretch.

The proposed reorientation of research activity focus is a key task for theory, and theory development alone justifies its importance to the mathematics education research community looking for fresh ways to understand its activity. The field of mathematics education research is populated by people who are typically quite good at mathematics, usually located in higher levels of education. Their efforts are often predicated on raising standards in a competitive environment to ensure adequate capability across the population but possibly rather less on wider inclusion across the spectrum of educational needs and aspirations. There are relatively few mathematics specialists working at primary level addressing needs at that stage of education. Mathematics at primary level is often tackled by more generalist educators where the specificity and identity of mathematics education might be seen very differently. Issues of inclusion in mathematics often need to be considered at a structural level of putting appropriate curriculums in place rather than equipping individual teachers with pertinent skills. For this reason, this book is less concerned with operating in a functional way at any specific level of education such as teacher agency but rather more concerned with understanding mathematics from a more general educational perspective across the breadth of schooling where the administration of that socially oriented schooling process impacts on the nature of mathematics as we understand it and on how it is taught. The book asserts a new social theory where both of those words remain in transition where the book's purpose is to articulate the mechanisms of that transition.

The book then addresses the domain, purpose and functioning of research in mathematics education. What is mathematics teaching? How do we improve mathematics teaching? Why do we want to improve mathematics teaching? What do we understand by improvement? Mathematics education research addresses many such questions. And although research and the scientific theories it produces may never reveal the truth, theories have proved very useful in guiding us around an infinite landscape, even if ultimately each scientific model or theory reveals the limits of its own functionality, style or endurance. But more generally, any story we tell about what mathematics is, or what a learner is, or what we are trying to do, will eventually become out of kilter with the times. New demands on "people" and new demands on "mathematics" change what both of them are and how they respond to each other. Research has as much to do with working out where we could go as it is with assessing where we are now. The current state of affairs can be depicted in many ways, where alternative mappings of our pasts and presents open alternative trajectories into the future. This provokes a more general question that motivates this book: What can theories do? How do we situate our theories in relation to other theories, past and present? Do new theories replace old ones or sit alongside them? Many contributions to theory in mathematics education comprise individual journal articles or chapters in edited collections[2]. Theories depend on the questions that we ask and the world views that we presuppose and typically theories, especially social theories are time-dependent, and need persistent updating. So in presenting "a contemporary theory of mathematics education research" the intention is to

[2] As examples, Springer has published theory-oriented chapters by over 100 authors in the following edited collections alone: Sriraman and English, 2010; Bikner-Ahsbahs, Vohns, Bruder, Schmitt and Dorfler, 2016 and Ernest, 2019b.

unsettle some of the common presumptions of mathematics education research in generating new ways of looking rather than to suppose any final resolution might be reached. But in unsettling, the hope is that new ways of understanding the interface between humans and mathematics will be suggested and stimulate life thereafter.

Chapter Two provides a theoretical discussion of how we understand mathematical knowledge. The theory presents rationality and belief as mutually formative dimensions of mathematics, where each term is more politically and socially embedded than sometimes depicted in the field of mathematics education research. The chapter considers alternative modes of apprehending mathematical objects derived as they are from this socially defined space. Two accounts of how a young child might learn to point at mathematical entities are presented, where alternative interpretations of this act of pointing are linked to conceptions of sharing understandings. This comparison then underpins a discussion of how mathematics is produced as entities to be acquired according to certain shared ideological schema that also shape who we are. The chapter's central argument is that rational mathematical thought necessarily rests on beliefs set within a play of ideological framings that partition people in terms of their proxy interface with mathematics. The challenge is then seen as being to loosen this administrative grip to allow individuals to release their own powers to generate diversity in their shared mathematical insights rather than being guided by conformity.

Chapter Three considers some of the arbitrary curriculum or assessment criteria that operate in the social construction of mathematics in educational institutions. The advance of mathematics as an academic field is typically defined by the production of new ideas, or concepts, which adjust progressively to new shared ways of being. That is, mathematical concepts are created or invented to meet the diverse demands of everyday life, and this very diversity can unsettle more standardised accounts of what mathematics is supposed to be according to more official rhetoric. For example, the expansion of mathematics as a field often relies on research grants selected to support economic priorities. In schools, economic factors influence the topics chosen for a curriculum. In some countries, there is a shortage of specialist mathematics teachers that limit curriculum choices and restrict the choice of viable teaching materials, educational targets or models of practice advocated by research in mathematics education. Our evolving understandings of who we are and of what we do shape our use of mathematical concepts and thus our understandings of what they are. School mathematics has been reduced according to ideological schema to produce its conceptual apparatus, pedagogical forms and supposed practical applications. The resulting cartographic definition of mathematics steers the production then selection of learners according to arbitrary curriculum or assessment criteria.

Chapter Four provides a more explicitly Lacanian examination of how teachers resolve the pressures of working to curriculum demands. Centred in the doctoral studies of my Manchester colleague Peter Pawlik (2020), the chapter considers how recent international developments in mathematics teaching have been influenced by what we see as the ideological notion of the mastery curriculum. Lacan's four fundamental discourses (master, university, hysteric and analytic) provide an analytical framework linking governance, institutionalised education and resistance. A case study of a teacher is used to illustrate how this discursive patterning is integrated into practice.

Chapter Five describes some empirical research in both primary and secondary university teacher education. It considers how practices of teacher education impact on classroom practice by new teachers and thus shape the mathematics that takes place. The theme is

explored through an extended discussion of how the conduct of mathematical teaching and learning is restricted by regulative educational policies that set the parameters of teacher education. Specifically, it considers the example of how mathematics is discursively produced by student teachers within an employment-based model of teacher education in England where there is a relatively low level of university input. It is argued that teacher reflections on mathematical learning and teaching within the course are patterned in line with formal curriculum framings, assessment requirements and the local demands of their placement school. Here, both teachers and students are subject to regulative discourses that shape their actions and, consequentially, this regulation influences the forms of mathematical activity that can take place and be recognised as such, but where this process restricts the presentational options for the mathematics in question. It is shown how university sessions can alternatively provide a critical platform from which to interrogate these restrictions and renegotiate them.

Chapter Six provides an account of my own mathematics teaching with student teachers and explains why I find teaching mathematics so exciting if it can be linked to the generation of multiple perspectives to be shared rather than the reproduction of a dominant view with prescribed pathways to this view. Some trainee teachers report on shared experience in a spatial awareness exercise concerned with exploring alternative apprehensions of geometric objects. Examples are provided of student teachers encapsulating their perceptions. The diversity of responses reveals alternative subjective positions each highlighting different qualities of the apprehended object. I have sought to show through my own teaching how mathematical challenges might be seen more in terms of students being supported in developing accounts of and gaining confidence in their own perspectives rather than meeting pre-set objectives.

Chapter Seven digs deeper into theory to consider further how the mathematical/human interface depends on the mutual dependency of how we understand mathematical objects and of how we understand human subjects. The apprehension of mathematical objects is examined through sessions with student teachers researching and critically analysing their own spatial awareness from a pedagogical point of view. The chapter is guided by the theoretical work of Alain Badiou whose philosophical model develops a Lacanian conception of human subjectivity and defines a new conception of objectivity. In this model, the conception of subjectivity comprises a refusal to allow humans to settle on certain self-images that have fuelled psychology and set the ways in which humans are seen to apprehend the mathematically defined world. The assertion of an object, meanwhile, is associated with finding a place for it in a supposed world, where the object may reconfigure that world in its very assertion. The composite model understands learning as shared participation in renewal where there is a mutual dependency between the growth of human subjects and of mathematical objects. Renewal is referenced to a diversity of ever shifting discursive parameters that enable learning through negotiating the spaces within which we operate and the objects those spaces allow. Learning to teach then comprises developing sensitivity towards the discursive spaces that allow others to build objects. The chapter again provides examples from my own teacher education activities centred in addressing these concerns.

Chapter Eight documents aspects of the discussion that has taken place as a result of socio-cultural theorists responding to my engagement with their work in my book *Mathematics Education and Subjectivity*. Specifically, the chapter responds to Wolf-Michael Roth's critical reading of the book. His reading contrasted my Lacanian approach with Roth's

own conception of subjectivity as derived from the work of Vygotsky, in which Roth aims to "reunite" psychology and sociology. I argue, however, that my book focused on how discourses in mathematics education shape subjective action within a Lacanian model that circumnavigates both "psychology" and "sociology". From that platform, this chapter responds to Roth through problematising the idea of the individual as a subjective entity in relation to the two theoretical perspectives. In line with the broader remit of this present book, the chapter argues for a Lacanian conception of subjectivity for mathematics education comprising a response to a social demand borne of an ever-changing symbolic order that defines our constitution and our space for action. The chapter concludes by considering an attitude to the production of research objects in mathematics education research that resists the normalisation of assumptions as to how humans encounter mathematics.

Chapter Nine discusses at a more historical level how our conceptions of mathematics and of ourselves as researchers, teacher educators, teachers and students have been transformed through mathematical activity being viewed through the apparatus of schooling and international comparative filters. This model provides an example of how changing practices impact on the social construction of mathematics itself. The chapter argues that the fields of psychology and mathematics each describe realities that are consequential to past human endeavours or conceptualisations. Neither of these fields depict stable truths.

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