

Review of Brown, Tony (2020). *A Contemporary Theory of Mathematics Education Research*. xxi+151 pp. Cham, Switzerland: Springer Nature. ISBN: 978-3-030-55099-8
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Introductory remarks - setting the scene of the book

Over decades now, as spelt out clearly in the Preface and throughout the book, Tony has constantly extended and developed his knowledge and ideas, reflecting on what they imply for teaching, for teacher education, and for research. Tony Brown's latest book builds on his previous publications, both articles and books. The articles are mostly jointly authored; he is well known for collaborating with colleagues and working with students, facilitating others in their development, to his great credit. The conferences he and his colleagues organized, entitled *Mathematics Education and Contemporary Theory*, only one of which I was able to attend, gave substantial space to presentations of ideas and deep and fruitful discussions, leading to several publications, as Tony describes in the preface.

Tony tells his own story, acknowledging his mentors, his work with students, and the literature that has been and continues to be his main inspiration, that grows with each book. I applaud the placing of himself, the author, in his work. I applaud also his early comment on school mathematics as not providing, for the majority of students, an experience of "the beauties of abstract thought" (p. 12). I have long recruited the argument that all children should be given the chance to "touch infinity," though from where or whom I recruited that actual phrase I can no longer remember!

As a reviewer I should place myself in my writing too. Like Tony, I have gained inspiration from writers in some of the other fields upon which education draws. Over the years I have worked with and recruited ideas from Lakatos, Wittgenstein, Walkerdine, Freud, Vygotsky, Marx and Bernstein, amongst others. My work on the social turn in our field was a key step in my learning and development (Gates & Jorgensen, 2014). I was therefore particularly keen and interested to see how Tony would respond to Wolff-Michael Roth's Vygotskian-framed critique of his 2011 book. Tony's responses come mostly in a chapter specifically on that critique, Chapter 8, called 'Subjectivity and Cultural Adjustment: A Response to Socio-Culturalism'. I'll come to that chapter later though.

As those who have encountered Tony's work will know, his theoretical resources come in the main from Lacan, Žižek, Barad and Badiou. Tony's knowledge of these authors' work grows with each publication, though keeping up with Žižek's frequent and often enigmatic utterances must be hard work. Indeed, at least once Tony indicates how he continues to struggle with what Žižek means sometimes. On page 114 he says: "I am still working on Zizek's unorientable alternatives (2020)." I'm sure I would too.

I have no objection to being required to try and understand what important

thinkers are writing, what they mean and how that can help understanding learning, teaching and research. This book, like his other works, demands of the reader that they put in the required effort. As Bernstein, another difficult writer, indicates, a strong grammar is potentially productive in our work and hence the effort to understand concepts of these writers is rewarded. Tony's book often helps the reader in accessing the language of his key authors, though sometimes his own writing requires sentences to be read several times.

Centrality of Mathematics and Theoretical Resources

Tony's program for this book is perhaps best expressed on page 91: "the key assertion of this book (is) that our conceptions of mathematical objects are functions of how we conceptualize the human subjects apprehending them." The shifts and changes in mathematical knowledge and also school mathematical knowledge are of central interest. Tony examines the latter from the point of view of teachers and particularly of students who will go on to be teachers. This latter, described in fascinating and inspiring detail in chapter 6, is quite central in Tony's ideas.

I take this program to mean that the book addresses three layered presuppositions: that students apprehend the mathematical objects (as in chapter 6); we (researchers?) conceptualize the students (humans), their activities and their ideas; hence we conceptualize the mathematical objects. I will examine whether these three layers work as I go through this review.

The theories worked with in this book step off from Freud. On page 4 he quotes the following:

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 recognized by it. Hence, even the sense of self is subject to disturbances, and the limits of the self are not constant."
(Freud, 2002, p. 5).

Notions of disturbances, limits, non-constancy, as well as defying encapsulations, are taken up by Lacan and subsequently by Žižek, Barad and Badiou, all of whom locate their work as developing from Lacan. Take, for example, the following (p. 19):

A Lacanian account of the human subject has no aspiration to settle down with a final correct version: "Don't expect anything more subversive in my discourse than that I do not claim to have a solution" (Lacan 2007). Here we do not have a mathematical backdrop that gets distorted through subsequent usage. This unity never existed in the first place. It "is just a retroactive illusion" (Žižek 2014, pp. 49–50). Further: "nothing has been abstracted from any reality. On the contrary it's already inscribed in what functions as this reality" (p. 14).

Thus, discourse comes to the fore and becomes, for Tony, the site for researching in our field. In introducing one of the research studies, that of the student teacher Emily, Tony writes that he,

...explores the discursive construction of the mastery curriculum using Lacan's notion of the master signifier, as exemplified in declarative assertions of "how things are". This analytical tool provides an approach to dis-

rupting habitual thinking patterns within regulative scenarios and opening alternative discursive avenues.” (p. 35)

This is his research goal; this is what he sees as the most productive direction for research in mathematics education and hence what he explores in this book. The idea that the discursive construction of the mastery curriculum becomes an analytical tool is less clear to me, though.

Data as exemplars

There are three chapters that present research data, used by Tony both to illuminate and ground his theoretical insights and to provide indications of how those insights can frame analysis/stories/research. The first is in chapter 4, an account of the developing ideas of student teacher Emily. The second is in Chapter 5, giving examples of action research with trainees encountering the constraints of the curriculum and assessment demands of the English and Welsh school mathematics systems¹. The third is chapter 6 where Tony gives an account of the mathematics activities of students on one of his Mathematics Enhancement courses for non-mathematics specialists who will be teachers of mathematics.

Chapter 4

Beginning with the case of Emily, struggling to make sense of her work as a teacher-in-learning against the background of the rather limited input of theory and practice from the University, a constraint imposed by the Department of Education, we see her abandoning some elements of what she would want to do and adopting others that have reality for her in her new context. Ensor (2001) worked with a well-developed framework for making sense of this kind of situation, a three way tension between university teacher education, the realization of the realities of her school, driven by the structures of the schooling and of education in England, that is of the government ideology, and her own desires to teach as she would wish, but also to both survive in the school and pass her course. In spite of this example of relevant research, and there are others, Tony says, a little further on in the next chapter, on page 54: “We know little about how new teachers understand mathematics following training across school and university settings and how student teachers conceptualize their own teaching of mathematics in schools.”

Tony sets up a Lacanian concept of “master signifier”² as an analytical tool to analyze and interpret Emily’s reflective diary across the teaching practice period, captured in the notion of “this is the way things are.” Coincidentally, Emily’s school has adopted what it calls a “mastery approach” and she endorses and is inspired by that approach: “After spending some time on this whilst at university,

¹ Scotland and Northern Ireland, the other components of the United Kingdom, have their own educational systems.

² “Lacan assigns great importance in his theorization of the psychoanalytic process to what he calls “master signifiers.” These are those signifiers that the subject most deeply identifies with, and which accordingly have a key role in the way s/he gives meaning to the world... Lacan’s idea about these signifiers is that their primary importance is less any positive content that they add to the subject’s field of symbolic sense. It is rather the efficacy they have in reorienting the subject with respect to all of the other signifiers which structure his/her sense of herself and the world.” From the *Internet Encyclopedia of Philosophy*, <https://iep.utm.edu/lacweb/>

I am truly impressed by the teaching style” (page 43). Issues of classroom control begin to come to the fore and she finds herself adapting her goals for her students’ learning of mathematics to center on getting to know them. She is looking for security and stability, closing “the gap between the fantasy of mastery teaching and the reality in the classroom”. Tony’s analysis of her developing ideas is captured on page 47: “In repeatedly mapping out classroom interactions to different permutations of discourse, we generate different possible understandings.”

As a framework for researching student teachers’ learning there are strong claims for what the theory can say:

In particular, it provides insights into the formulations between knowledge, master signifier, divided subject and otherness. It combines in one model, psychic structures, motivation, with semiotics and discourse. In considering the various positions of the master signifier, we produce different understanding of how the subject engages with discourse. (p.47)

The extracts from Emily’s diary are not enough for this reader: I’d like to have heard more, but of course there isn’t space in a book chapter whose intent is more general. The data are presented as illustrations of the usefulness and application of the theories. Regarding what I have described as the three layers of Tony’s analysis in this book, this chapter is about how we researchers conceptualize the students, their activities and their ideas. The resources Tony draws on give him some tools for discursive descriptions of the changes in Emily’s perception of herself as a teacher and her ideas, the researcher’s stories perhaps. Some writers develop frameworks for discourse analysis to be applied systematically, such as that I adapted from Holland and Lachicotte (2007) to analyze the self-reporting of a teacher (Lerman, 2012). Whilst limited as just one structure for an account, it offers at least an opportunity for scrutiny and critique by readers of appropriateness of the framework and of the analysis carried out there, since the rules for reading this extract as a case of that category are made explicit.

Chapter 5

In this chapter, on page 49, through a study of a group of student teachers, Tony addresses a key theme of the book: “Mathematics is a function of its location and the way in which people are working mathematically in that location.” Further into the chapter, on page 57, he writes: “The research sought to avoid supposing that there was a correct version of school mathematics to which the teachers were supposed to subscribe. This chapter is guided by the more open research question: How do student teachers discursively produce school mathematics?”

This question is particularly pertinent in light of recent government changes whereby teacher education has become much more school-centered and thus the input from Universities is much reduced. In this chapter Tony presents and analyses data from a research study designed to identify the effects of those changes on how the student teachers perceive their role, in particular in relation to the nature of the object, the mathematics; he questions whether they are “curriculum makers or curriculum implementers” (page 55).

This is a very rich chapter, far too much in it for me to do it justice in this review. To take just a few observations, Tony and team found that: the student teachers

were not always aware of how the regulative discourses were shaping their practices; primary students were very aware of the schools' policies and they talked about applying the teaching methods preferred by the school; students weren't generally aware of assessment driven processes they were working with; and national standings in TIMSS and PISA had a great effect on curriculum in mathematics.

Tony explores what new challenges can be taken up for the University-based part of the preparation of teachers, such as "to provide a platform from where both tutors and trainees can critically analyze the issues arising in school practice".

In relation to the role of research, Tony writes: "If mathematics education research still influenced the practices of the student teachers, then the route through which this influence was achieved is not entirely apparent" (p.60). This is where some sociology can help, as in Morgan, Tsatsaroni and Lerman (2002) and Lerman & Adler (2016), where we attempted to map how agents in the field of mathematics education and in surrounding fields influence each other.

Towards the end of the chapter, Tony indicates the benefits of seeing teachers as researchers of their own practice perhaps informed by guidance from tutors, as in this example that Tony takes from his paper with Chris Hanley (Hanley and Brown 2016, p. 15):

...students were tasked with noticing how projected fantasies dictated a sense of what was possible and how language might be used to frame things differently. Students faced difficult choices. If they decided to stick with current interpretations, to suture meaning here and not there (Žižek, 1989) what developmental opportunities were being missed?

There is a long literature on the concept of teachers as researchers of their own practice, much of it evidenced in the proceedings of the PME.

Chapter 6

In Chapter 6, Tony gives an account of the mathematics activities of students in one of his Mathematics Enhancement courses. These examples of students' work, which I have read elsewhere, are quite wonderful and inspiring. Given the freedom to imagine, experiment, share, move around, and take over spaces in order to struggle with spatial problems, these students produce some fantastic work. The freedom to visualize and invent is captured wonderfully and contrasts vividly with school students engaging in a set mathematics curriculum and student teachers struggling to satisfy set expectations whilst expressing resistance or at least the desire to resist. The photographs and diagrams in this chapter are able convey some of the creative work of the students. I wish I had been there to see them working and to see the fruits of their collaborations.

Tensions

On page 25, Tony writes:

In schools, economic or political factors influence the topics chosen for a curriculum. 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. Moreover, public images of mathematics pull in many directions that produce alternative conceptions of the field. These disparities of vision result in much variety in how mathematical concepts are materialized in everyday activity. They also point more fundamentally to the uncertain ontology of mathematics as a supposed field itself and its evolution ac-

ording to the demands made on it.

Two tensions can be discerned here that run through the book and with which Tony, and indeed all of us as researchers, struggles.

The first concerns the mathematics that constitutes the school curriculum. In the little structure I set out above as what seems to me to be the overall plan of the book, we are in the arena of how researchers conceptualize the students, their activities and their ideas; hence we conceptualize the mathematical objects. On the one hand, Tony develops from the theoretical literature the idea that school mathematics is constantly being changed both in response to pressures from Government sometimes reacting to UK performance on TIMSS and PISA tests and sometimes reflecting their own ideologies of what children need to learn, and also in response to developments in technology or priorities in the field of mathematics. He writes (p. 128):

The book concludes by suggesting that curriculum interventions, whether arising from new models of mathematics teacher education or from the influence of comparative testing, are not distortions of pre-existing conceptions of mathematics. Rather, they reflect new ways in which mathematics is evolving as a discipline, as a field of knowledge.

On the other hand, however, school mathematics looks today very much like it did 55 years ago, when I began my first secondary mathematics teaching job. Actually, Tony constantly emphasizes the evolution of school mathematics, and I think that's a lot to do with the power of the work of the Mathematics Enhancement students. It feels as though that ought to be possible in schools – but it's at least very rare. Whilst the insights into the mathematics arising from the tasks Tony sets them the mathematics itself is rich and deep, as he says on page 74: "Most of the units comprise straight mathematical content."

A second tension is more pointedly political (e.g. his references to the work of Alexandre Pais); while researchers and teachers tinker at the edges of the inequitable distribution of social capital, it is the whole capitalist system that demands the failure of the many to ensure the success of the few which really dominates the school system—against that we are, largely, powerless. As Tony says:

The mathematics that we encounter in schools has been shaped according to ideological schema to produce its pedagogical forms, schematic applications and the type of students it wants to include or exclude or can afford to fund or not. (p.30)

Sociologists of education, somewhat unloved by Tony, have been pointing this out for many decades. We cannot give up analyzing the state of education and our relative powerlessness to impact on that state, nor trying to mitigate the worst excesses of inequitable distribution on our students. We just struggle with this tension.

The socio-cultural

I turn now to Chapter 8, Tony's views on sociocultural theories, his reply to Roth's critique of Tony's 2011 book. Tony writes negatively about Vygotsky, activity theory and sociology, as he does for constructivist inspired research. He says, on page 114:

"There is however a risk that we always go down the same tram tracks

when talking to our audience of mathematics education colleagues since our working environment is governed by certain norms, preferences, habits and expectations, which result in certain styles of familiar action that may preserve past inequities, redundant models of practice and tired theoretical paradigms.”

Further, on page 128, he refers to such work as “A normalising drag”!

Re-reading Roth’s (2012) response in *Educational Studies in Mathematics* it is clear to me that Tony hasn’t engaged with the breadth of Roth’s critique. Certainly Roth’s response piece focuses substantially on what he, and I, see as Tony’s misunderstanding of Vygotsky’s work, but he seems not to have noticed that Roth is also critical of Tony’s reading of Lacan, Derrida and others.

I have found and continue to find the sociocultural work, as Roth describes it in that paper but also in his 2017 book, inspiring and rich in resources for conceptualizing humanity, culture, the societal, ideology, the individual and the education process. The Marxist ideas that inspired Vygotsky are as relevant today as then, contrary to Tony’s view of that work being stuck in the early part of the century in the Soviet Union. Indeed as Roth shows in his 2017 book Vygotsky was rethinking his whole body of work as he lay on his deathbed, perceiving that he had not understood the significance of Spinoza’s ethics for psychology and education. Roth and Radford have been working on making ethics central in their research on children’s learning and on teachers’ and researchers’ work.

However, it is also clear to me that Tony and Roth are talking/writing past each other. The theoretical resources on which Tony and Roth draw are very different and neither will persuade the other to move away from their position. They can look at the same transcript or other text from a classroom and interpret them quite differently. This is not surprising from a sociological point of view. These research discourses, as well as others that circulate in our field (e.g. constructivism, radical constructivism, complexity theory) are parallel, they are different discourses within a horizontal knowledge structure, as Bernstein describes. I won’t, therefore, try and return to Roth’s critique and show what Tony has missed. Instead I want to look at what we, as researchers, expect from theoretical resources, from the discourses that each of us chooses from the range of fields on which mathematics education draws and from those that are mathematics education specific.

Putting theories to work

Much research in our field is purely pragmatic: identify a problem; plan potential mediations; implement them; design an evaluation of the effects of the intervention; present and discuss the findings. Like Tony, I am convinced that research, as well as teaching actually, draws on theory whether the researcher acknowledges those theories or not. Research is that much more useful, productive and well-founded when theories are made explicit.

Following Bernstein, education is a region, with a face to theory and a face to practice. This distinguishes our territory from fields such as philosophy, which are interested in but not concerned with any application in practice or in social life. For us, research questions usually arise in practice and need to feed back to practice to be of any value. The theoretical fields from which we draw include mathematics, philosophy, psychology, anthropology, history, amongst others.

Theories are best thought of as a resource, to be put to work in research. I'd like to think that the little bit of sociology in this paragraph already indicates some value in one of the fields that Tony finds a drag. That Bernstein (it could have been Bourdieu, or Apple or others) was a Marxist sociologist means his work coheres well with Vygotsky, as he acknowledged (Bernstein, 1993). Bernstein's notion of recontextualization, absolutely central in his work, argues that ideology drives choices made in the philosophy of education, in constructing the pedagogical device. Tools such as these already mentioned, recontextualization, pedagogical device, and others such as classification and framing, provide structures for research on teaching and learning at the micro level and educational structures and policies at the macro level, and how this latter manifests in the micro interactions of pedagogic relations within the classroom.

What concerns me in Tony's elaboration of the ideas of Lacan, Žižek, Barad and Badiou is that the best they can offer is, as I quoted above, ways of exploring "the discursive construction of the mastery curriculum using Lacan's notion of the master signifier, as exemplified in declarative assertions of "how things are". His analytical tool "provides an approach to disrupting habitual thinking patterns within regulative scenarios and opening alternative discursive avenues." We can look at the classroom, learning or teaching situations and challenge what might appear obvious and apparent with alternative descriptions. But how do these connect with the classroom? Can such macro level insights provide tools for reading what happens there in the way that Bernstein does? I could point to radical constructivism as another discourse in our field that has a strong grammar and sets of tools for designing, realizing, analyzing, predicting and so on; a language in other words, and a sophisticated one at that.

As Marx said in *Eleven Theses on Feuerbach*, also inscribed on his grave, "The philosophers have only *interpreted* the world, in various ways. The point, however, is to *change* it." Setting out descriptions that postulate connections between the macro and the micro in education creates possibilities for alternative conceptions, and hence change.

Conclusion

I don't find radical constructivism rich enough for my thinking about teaching, learning, research, indeed human development (Lerman, 1996) but I would not deny its potential as a discourse about learning and teaching and for research. As an examiner of PhDs and EdDs, and reviewer of articles for many journals, I expect authors to be explicit about the theories that underpin their research and explicit about how these theories provide methodology, methods, research and analytical tools. I don't expect authors to be using the theories that I prefer to work with.

Hence I am not suggesting that Tony should change his theoretical resources. On the contrary, Tony's reading of Lacan, Žižek and others does provide perspectives for new and powerful stories to tell about how to read student teachers' texts, for researchers and teacher educators, new ways of thinking about doing mathematics, for the students and the tutors, and what might be happening for the student teachers that lead to what they write, a form of psychoanalytic writing. There's a resonance here for me with my own experience of psychoanalysis. I guess I'd like also to see Tony make the kinds of connections that sociology offers: identify and

illustrate what can be drawn from the theories with which he engages, including methodology, methods, and analytical tools which provide what Bernstein would call recognition and realization rules. Far from 'tired' and 'a drag', I think.

I wanted, in this review, to give enough of a sense of the book that will encourage colleagues to read it. In parts it's not an easy read but as I have indicated the work required to engage with Tony's ideas are well rewarded, and it gives me the resources to re-examine my own work. Roth ends his article with the same thoughts: "It is precisely for the same reason that I recommend MES (*Tony's 2011 book*) to my readers, not because I expect them to agree with MES or with me but because I anticipate that they will come to better understand themselves and their subjectivity as they grapple with their disagreement with MES, a text designed to be controversial" (Roth, 2012, p. 471). The knowledge of each of us grows from critique.

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