“It’s helping your child experience the world”: How parents can use everyday activities to discuss maths with their children, presented at the European Conference of Educational Research,
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Abstract
This paper presents the findings of the Everyday Maths project, funded by the Nuffield Foundation (UK). The aim of the project was to develop and pilot a series of maths workshops which allowed parents to (i) discover their potentially tacit and taken-for-granted mathematical skills and knowledge, and (ii) explore creative ways for parents to share such skills and knowledge with their children, with the view of enriching mathematical dialogue at home. Unexpectedly, some parents who participated in the project’s workshops engaged in sustained, critical reflection about the very “meaning” of mathematics itself (e.g. by reimagining mathematics as being embodied, sensual, discursive and productive). This had implications for how parents felt they should talk to their children about mathematics. In this paper we illuminate parents changing understanding of “mathematics” by drawing Jacques Derrida’s post-structuralist deconstruction. This approach, we argue, helps make parents’ mathematical reflections intelligible and allow us to theorise why and how parents refined mathematics in the way they did.

Introduction

Across Europe the numbers of students pursuing maths compared with other subjects is in decline. Despite this, only a minority of countries in Europe have any national strategies aimed at increasing students’ motivation in mathematics (Parveva et al, 2011). It is important, therefore, to support children’s engagement with and enjoyment of mathematical concepts at an early age. This paper presents preliminary findings from workshops with parents in English primary schools in the Everyday Maths project. These workshops aimed to support parents in developing conversations with their children around the mathematics that arises in everyday life.

Existing literature on parents' roles in children’s mathematics learning often focuses on parents' abilities to help children with classroom tasks. However, there is conflicting evidence regarding parents' abilities to help children with homework. A meta-analysis of this research indicates that

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1 Please note: this paper should be read as a “work in progress” and preliminary to future publications.
helping with homework can have a negative effect on children’s achievement, especially when help consists of supervision rather than more engaged forms of guidance (Patall, Cooper, & Robinson, 2008). Alternative forms of parental involvement are less dependent on schoolwork and resourced by household activity. Families often face situations of problem solving requiring considerable mathematical knowledge and practice (Goldman & Booker, 2009). Research on mathematics in the home consistently shows that families often draw on distinctive funds of knowledge that include an array of information, skills and strategies that can be qualitatively different to, but equally effective as, the mathematical knowledge that children are taught in school (Baker & Street, 2004; González, Moll, & Amanti, 2005). Earlier attempts to connect home and school mathematics demonstrate that day-to-day household situations offer a context rich in opportunities for children to learn and apply different forms of mathematics (Winter, Salway, Yee, & Hughes, 2004).

The everyday activity of parents is expected to provide a rich source of contexts for engaging in effortful and meaningful mathematics practice. Our own research (Jay & Xolocotzin, 2012; Xolocotzin & Jay, 2012) indicates that young children and their parents participate in a range of household situations that can be addressed mathematically. For instance, children reported taking part in the budgeting for parties and holidays, and showed an awareness of household economy management, including the selection of mobile phone networks and utilities providers. Children also showed concern for longer term financial issues, such as saving for university and ‘the future’, even whilst still at primary school. Monetary practices such as receiving pocket money, spending and saving were also frequently described as part of everyday family situations. There were outstanding cases in which children described how their parents help them to apply sophisticated concepts such as investment and profit in authentic contexts such as markets or the internet.

Aside from monetary activities in which children and parents are involved, in line with Goldman and Booker (2009) we have found that family activities can entail a range of mathematical operations, often involving arithmetic and counting but also including logic, geometry, optimization, combinatorics, measurement, and algebra. Other processes important for using mathematics can also be observed in everyday situations at home, such as explanations, generalizations, representations and the development of problem solving strategies and approaches. Collaborative construction and use of tools, including calculators, rulers and other measuring tools, computers and visual representations, is also important. By resolving everyday problems with their children, parents can share their mathematical knowledge by modelling, prompting, or disclosing the solution.

This paper asks how useful a short series of workshops is in supporting parents to develop their confidence in talking about mathematical concepts with their children, and what can be learned from the experience of running the workshops.

**Everyday Maths project**

The Everyday Maths project reported in this paper aimed to develop methods for empowering parents to reflect upon and share their uses of mathematics in everyday life, so they can support their children’s mathematics learning. The project focuses on parents of children in Year 3 and Year 4 in South England primary schools (children were aged 7-9 years old). In the first stage, we investigated parents’ motivations and attitudes towards their children’s mathematics learning, and
of their own uses of mathematics. We did this through focus groups and informal playground interviews, the findings of which are reported elsewhere (Jay, Rose, & Simmons, 2014). In this paper we report the second stage of the project, which involved designing workshops to empower parents to reflect upon and share their social and cultural funds of knowledge relating to mathematics with their children.

Four primary schools participated in the workshop stage of the project. The schools were recruited from among the original 20 schools in the first phase, to provide a range of backgrounds according to levels of free school meal eligibility (commonly used as an indicator of deprivation), ethnic mix, percentage of children with English as an additional language, and performance at Key Stage 2 tests.

An introductory session was run in each school to explain to parents what the workshops were about and how they would work. Workshops were held in the mornings after parents had dropped their children off. To support recruitment of parents, the researchers spent time in the playground during the mornings and evenings of the week leading up to the first workshop, distributing flyers and chatting to parents about the workshops.

Each workshop was facilitated by two researchers, who guided the general direction of discussions and where necessary gave a few illustrative examples to support and encourage parents’ contributions. At the first workshop, parents discussed the kinds of activities they did with their children, and started to explore the maths that was inherent in those activities. The researchers asked parents to come back to the next workshop ready to discuss some examples of everyday activities which they did with their children, and gave parents digital cameras, books, and pens as tools to document activities. In the second workshops, parents discussed the maths that could be found in their examples of everyday activities, and started to talk about how they could introduce those ideas in conversation with their children. The third workshops focused on how parents experienced introducing maths into conversations with their children. The fourth workshops explored the range of conversations which parents have been attempting with their children, and parents’ views on how useful they found the workshops.

Workshops were audio-recorded and later transcribed. They were initially analysed thematically using QSR NVivo 9.

**Context to the findings**

In this paper we present some unexpected findings of the workshops. Specifically, we present excerpts of data in order to illuminate the tensions that parents felt towards both “school maths” and “everyday maths”. We then explore how these tensions gave way to parents (re)imagining the history, purpose, and meaning of “maths. Finally, we explore how these imaginings create potential opportunities for parents to engage children in mathematical talk in out-of-school contexts. We then draw on Derrida’s deconstruction to help make these findings intelligible and theorise why parents refined mathematics the way that they did.
**Workshop Findings**

**Parent 1 Excerpt**

I think it makes it difficult when we’re sat there at home and we’re doing these worksheets and we’re explaining, “Right, we have to do A, B, C” , and they’re getting the answer but they’re doing it a different way and then we’re, “Is that right? Did you guess that?” Because I know mine will guess every now and again and they’ll get lucky, so... it can be difficult. I get left behind, not because I don’t know the answer, I’ve got no problems with maths whatsoever... I struggle more with just what I would see as, really convoluted and confusing systems, to me. Obviously it works for the kids because that’s how they’re being taught. But it does put me off because I sit down, I think, “Oh I just can’t wait to get this over and done with”. Because I can’t – to what I would – I see the old ways so straightforward, they’re logical. Yeah, maths is a pure science, it’s beautiful, there’s no grey area and one of the things is that these new systems you add a bit and then you put that in a little box up here and take a little bit away and then you bring it back and it’s like, ‘I’m sorry, I’ve got lines and numbers, they’re everywhere, where’s my answer?’ That’s what puts me off.

In the above quote, a parent describes the problem he has with the maths his children are learning in school. He finds the methods taught “convoluted” and “confusing” (“‘I’m sorry, I’ve got lines and numbers, they’re everywhere, where’s my answer?’”) and wonders whether his children understand the maths or have simply guessed the right answer. The parent’s difficulties in comprehending the maths taught to his children impacts upon his enthusiasm towards helping with homework (“I sit down, I think, ‘Oh I just can’t wait to get this over and done with’”). What is particularly interesting in the above passage is the parent’s description of different types of maths. Whilst school maths is problematic, the parent is fond of maths in an idealised form - he describes it as “a pure science”, something that is “beautiful”, and lacking a “grey area”. The parent then implies that the maths he was taught as a child was somehow closer to this idealised, even romanticised image of maths (“I see the old ways so straightforward, they’re logical”). So, whilst the parent dislikes the maths being taught in schools today he almost yearns for a return to what is described as maths in its purity - a return to the “old ways” when maths was cleaner and simpler.

This theme of “purity” emerged in different guises during the workshops. Compare the above comments to the comments made by a parent below. The parent below has difficulties comprehending how the Everyday Maths workshops will support her children’s learning:

**Parent 2 Excerpt**

Okay. So one of the problems is that at school they’re mostly concerned with [...] multiplication and arithmetic rather than all this other stuff [i.e. Everyday Maths] which, admittedly, is maths. So then I guess the problem is I’m always thinking “Well, how am I going to reinforce the stuff they’re doing at school? How do I make that relevant because actually it’s not?” [...] So it’s almost like you’re arguing for a different maths course right at that point. You wish the children did the maths that was relevant to the world rather than trying to make the world relevant to the maths they’re doing [in school].
Parent 2 felt that the mathematics being taught at her child's school was abstract in the sense that it was deemed to lack real world application (“at school they're mostly concerned with [...] multiplication and arithmetic.” “How do I make that relevant because it’s not?”). By contrast, she felt that the Everyday Maths workshops presented something of a polar opposite or inversion of school maths by being derived from real world applications. The parent’s main concern was that school maths was the most important maths for her daughter to learn and that Everyday Maths was not going to support (“reinforce”) the learning of school maths. This led the parent to suspect that the researchers facilitating the workshops wanted to replace school maths. Interestingly, the parent implies that rather than teaching maths which was relevant to the world it might be more helpful to “make the world relevant to the maths they're doing [in school]”.

Parent 1 and Parent 2 privileged the idea of “pure” maths but in different ways. Parent 1 was biased towards the maths he was taught at school as this was purer (logical, straightforward) than the maths being taught in his children's school (which was described as being messy or convoluted - with lines and numbers in strange places on the page). Parent 2 felt that the maths taught at her child's school was purer than the maths being discussed in the Everyday Maths workshops. She felt that school maths was more abstract in the sense that it lacked real world application to the same extent that Everyday Maths did, and suggested that we might make the world relevant to the abstract maths being taught in schools rather than vice versa.

In contrast to Parent 2, Parent 3 (below) attempted to make school maths relevant to the real world. In the workshop he described walking through a forest with his daughter and finding a rope swing. He tried to introduce mathematical talk about the movement of the rope but struggled because the rope did not behave as expected:

Parent 3 Excerpt

No, on the rope swing [...] I had a little chat about why you swing and how fast should you swing and the idea that in theory you should swing to the same height on the other side. It’s always difficult that because of course in practice you don’t get... you let the rope go on its own it doesn’t go anywhere near, which is always a bit tricky. But yeah I couldn’t get much more out of that.

In the above example the parent was trying to introduce the concept of oscillation to his daughter in order to explain the movement of a rope swing. However, the rope did not swing evenly like a pendulum (“in theory you should swing to the same height on the other side”) and without this perfect or even swinging motion the parent struggled to talk about maths (“I couldn’t get much more out of that”). The idea of “getting the right answer” or modelling school maths in out-of-school contexts caused problems for various parents in the workshops. Parents - like Parent 2 - felt that some of the maths being taught at school lacked real world application and, without a different understanding of maths to draw on, such parents were limited in what they could talk about. Parents - like Parent 3 - tried to introduce school maths to everyday contexts but struggled.

In a significant and unexpected turn, some parents in the workshops began to question the meaning of mathematics itself and debate its origins, usefulness, and purpose. For these parents, defining and theorising maths was something of a priority and led to parents imagining an alternative to “school maths”. Through prolonged discussion of the meaning and nature of maths, parents began to re-
imagine and redefine maths, their relationship to maths and how they can interact with their children using maths.

**Parent 4 Excerpt a**

[...] I don’t see maths as a separate entity that’s kind of divorced from the world. I think there is a time in the world when maths didn’t exist but that people were still having experiences of the world and there would be an experience of these things being in this container but without the concept of number to be able to count them, and that maths just has a – people over time have developed concepts to help us explain and understand aspects of the world and over time a collection of those concepts has been put into another category and said “We’ll call this maths”.

Parent 4 theorised the emergence of mathematics through time and argued that the subject is ultimately grounded in our experiences of the world as opposed to being “divorced” from it. Prior to the emergence of mathematics (“a time in the world when maths didn’t exist”) people had raw experiences of objects, events and relationships but lacked sufficient concepts to make these experiences intelligible. For example, people may have experienced items in a container (perhaps seeds in a bowl) but without the concept of number it was impossible to count the items. Concepts such as “number” were thus developed to help categorise and make sense of the world (“to help explain and understand aspects of the world”). At some point in time a selection of these concepts was eventually clustered together to form the subject “mathematics” (“We’ll call this maths”).

What is important here is not the historical accuracy of Parent 4’s account but the fact that - for him - mathematics is intimately linked to our experience and engagement with the world. Our experience is primordial to mathematics. Or, to put it differently, mathematics presupposes our engagement with the world - it has a functional value which serves our (experiential) interests and cannot in its entirety be abstract or detached from the world. This framing of mathematics fed directly into the way Parent 4 thought about talking about mathematics with his son in everyday (out of school) contexts:

**Parent 4 Excerpt b**

[...] I do really enjoy that thing of being with a child and like “Wow, this is an amazing experience isn’t it? How are we going to make – oh look, feel this. Actually I have got a bunch of concepts that I’ve kind of learnt from school that you haven’t come across yet but let’s stick with how you’re experiencing this” and then maybe slowly I can say “Well, look have you noticed there’s a kind of shape to this. We call this a square”.

Parent 4 took pleasure in experiencing the world with his child, sharing the child’s wonderment in this experience (“this is an amazing experience, isn’t it?”) and being attentive to the senses (“oh look, feel this”). For Parent 4, this raw or immediate experience was prerequisite to introducing mathematics in conversations in out-of-school contexts. Unlike Parent 1 who described lacking appropriate subject knowledge to support his children’s homework, Parent 4 felt that he had sufficient mathematical knowledge to impart to his son in everyday contexts (“Actually I have got a bunch of concepts that I’ve kind of learnt from school that you haven’t come across yet”). However, for Parent 4, the concern was to avoid introducing mathematics to conversations too quickly.
Instead, Parent 4 preferred to “stick with how you’re experiencing this” before “slowly” introducing concepts such as shapes to classify experiences.

**Parent 5 Excerpt:**

Respondent: I was just thinking about what you were saying, so pre-maths in the invention of maths we had this felt, sensory, direct, experience of the world and then we wanted to – because we’re sort of like that – we want to go “Yeah, but what is it? What shall we call it? It’s that thing that shaped like that give it names so then you have language; using language to name things and numbers to help use measurement and understanding... I’m just thinking why? Because we want to replicate what’s in nature. So you have this sort of bio-mimicry or something; so you have the wheel, so you want to make the wheel because circles exist in nature, you want to make your own so how do you go about that? So you need a certain sort of strategy or series of things to help you replicate nature.

[...]

Respondent 2: Yeah, you don’t want to have to say “That shape that has those sides that all seem the same”.

Respondent: Yeah.

Respondent 2: Having the number “four” really helps in describing what a “square” is, and having the word “square” really helps in describing what that shape is, doesn’t it?

In the above passage Parent 5 responds to Parent 4’s comments about the “invention of maths”. Like Parent 4, Parent 5 imagines a “pre-maths” society in which our experience of the world is not filtered through a mathematical lens but, instead, is more immediate and sensuous (“felt, sensory, direct”). However, unlike Parent 5 - who suggested that mathematics emerged as a collection of concepts used to make the world intelligible - Parent 5 implies that we first discovered something in the world (e.g. circles), and that mathematical language or taxonomies were created to classify observed phenomena. In other words, concepts emerged from direct observation, and language was introduced to label these concepts and observations. This process was motivated by the desire to replicate what was in nature (“bio-mimicry”). Furthermore, these concepts become interlinked - the symbolic turn provides shorthand for referring to and defining other concepts (“Having the number “four” really helps in describing what a “square” is, and having the word “square” really helps in describing what the shape is, doesn’t it?”

**Parent 6 Excerpt**

I took [daughter’s name] swimming the other day, and I thought, in that there’s tonnes of maths. You know, talking about, you know, the weight of your body in the water, how does it feel differently from when you’re climbing out of the pool you feel really heavy and then when you get in you feel really light and you know, how fast can you go in the water and how deep can you go and how much do you have to push to get back up and... and we had this ring, this little ring that we were throwing to each other for it
must have been half an hour, [...] we so throwing it, trying to catch it on your arm [...] So, yeah, there’s, there’s motion, there’s all kinds of experience going on.

Parent 6 presented perhaps the most sensuous account of mathematics we heard in the workshops. Parents 4 and 5 theorised a time before mathematics came into being in order to postulate its original purpose (e.g. in order to classify, describe, and support the replication of nature). By contrast, Parent 6 “found” mathematics in her embodied sense of self when reflecting about how she relates to and engages with her immediate environment. This led directly into suggestions topics for discussion with her daughter when swimming. For example, Parent 6 described the change in sensation between getting in and out of a swimming pool (“when you’re climbing out of the pool you feel really heavy and then when you get in you feel really light”), as well as a change in a sense of agency or affordances when in the water (“how fast can you go in the water and how deep you can go and how much do you have to push back to get up”). These direct experiences of her body were intertwined with her understanding of the world - concepts of weight, force, energy, depth, pressure, etc. emerged through a direct sense of her body and her capacities to act in the water. Parent 6 extends these insights to her interactions with her daughter too - throwing a ring in the swimming pool can be understood in terms of motion.

**Derrida and Deconstruction**

Textbooks introducing Derrida’s work sometimes begin by offering a cautionary note about the complexity of Derrida’s language and his refusal to offer clear and simple definitions of the terms he coins. The anxiety of authors writing secondary texts about Derrida is exacerbated by the fact that Derrida’s work challenges stable, unquestioned and fixed meanings (e.g. the finality of definitions). And herein lays the ironic definition of one of Derrida’s key terms (and something we will be applying to data in the next section): “deconstruction”. Deconstruction is a term used to describe a process which creates ambiguity or undecidability of meaning in a text. Some have interpreted this as meaning that deconstruction is a way of “reading” which gives rise to undecidability, what Powell (1997) refers to as “a submissive mode of reading authoritarian texts, or any texts” (p. 6). Deconstruction begins “from a refusal of the authority or determining power of every ‘is’, or simply a refusal from authority in general” (Lucy, 2004, p. 11). This mode of reading involves decentring: “if someone were to use the word Krishna, or Christ or Kahuna or X in an attempt to center or ground their myth or philosophy or theology or war in some stable, unchallengeable meaning from the transcendental Great Beyond, then that central name or concept would be vulnerable to deconstruction” (Powell, 1997, p. 22). In other words, deconstruction challenges understandings of texts or utterances which presuppose a singular, authoritative or unarguable meaning (e.g. perhaps because the meaning is said to be divine).

Derrida does not offer a “tool kit” or explicit instructions informing others how to go about deconstructing texts. For Derrida, deconstruction is not a method that is applied to texts (“deconstructionism”). Instead, it is something that happens within texts:

> The way I tried to read Plato, Aristotle, and others, is not a way of commanding, repeating, or conversing this heritage. It is an analysis which tries to find out how their thinking works or does not work, to find the tensions, the contradictions, the
heterogeneity within their own corpus [...] What is the law of this self-deconstruction, this ‘auto-deconstruction’? Deconstruction is not a method or some tool that you apply to something from the outside [...] Deconstruction is something which happens inside; there is a deconstruction at work within Plato’s texts, for instance, within the Timaeus the theme of the *khôra* is compatible with this supposed system of Plato. So, to be true to Plato, and this is a sign of love and respect for Plato, I have to analyse the functioning and disfunctioning of his work” (Derrida, 1997, pp. 9-10).

Derrida finds “tensions” and “contradictions” inherent in the texts he reads, and this leads to self/auto-deconstruction (the text is always already deconstructing itself). He discovers tensions and contradictions by analysing the “functioning” and “disfunctioning” of the works he reads. Or, as Lucy (2004) puts it: “If things are deconstructable, they are deconstructable already - as things” (Lucy, 2004, p. 13).

Derrida’s notion of deconstructing is intimately linked to a range of other concepts, including “binary oppositions”, “différance”, and “presence”. Each of these concepts will be discussed in turn.

According to Derrida, we have no access to reality except through concepts, codes and categories, and the human mind functions by forming conceptual pairs (Powell, 1997). These conceptual pairs - or binary opposites - take many forms (right/wrong; male/female; mind/body; nature/culture; Christian/pagan). The problem with this way of thinking is that each binary pair consists of a dominant, central concept and a marginalised, ignored or repressed concept. “One of the two terms governs the other (axiologically, logically, etc.) or has the upper hand” and so the binary opposition is never one of neutral difference but always of “a violent hierarchy” (Derrida 1991, in Lucy, 2004, p. 14). However, Derrida holds that deconstruction is not brought to a binary opposite, but rather is the “impossible condition of possibility of every possibility” (Lucy, 2004, p. 13). Deconstruction consists of “deconstructing, dislocating, perhaps disarticulating, disjoining, putting “out of joint” the authority of the “is” (Derrida 1991, in Lucy, 2004). Lucy explains that this involves firstly identifying the binary opposites in a text, inverting the hierarchical relationship which empowers one and suppresses the other before neutralising both terms. Powell (1997) interprets the latter as allowing both to enter into free play or instability, meaning the emergence of non-hierarchical and non-stable meanings almost jostle together for dominance. Finally, a new concept is said to almost burst onto the scene, a concept which was not possible under the old hierarchical regime:

> By means of this double, and precisely stratified, dislodged, and dislodging, writing, we must also mark the interval between inversion, which brings low what was high, and the irruptive emergence of a new “concept,” a concept that can no longer be, and never could be, included in the previous regime (Derrida, 1991, in Lucy, 2004, p. 13).

Différance is another term intimately linked with deconstruction:

> Différance marks the opening of a system of differences in which everything acquires meaning and value according to what ‘we believe we know as the most familiar thing in the world’ (OG, 70-1) - that the outside is not the inside. But ‘without difference as temporalization, without the nonpresence of the other inscribed within the sense of the present (OG, 71), nothing could be said to have meaning or value in ‘itself’ Everything differs, which is to say that everything differs from other things. To say that something
**Deconstructing maths: making sense of the data through Derrida**

Deconstruction in the context of the workshops is a challenge to the definition of maths; it is a refusal to accept conventional understandings of what maths “is” (i.e. school maths), but also a refusal to accept what “everyday maths” is. Is this “is” in the context of what maths means for parents maths engagement with/for their children? It appears so. The workshops illuminated the “deconstructable” nature of “school maths” for the parents, but it also led to illumination of the deconstructable nature of “everyday maths”. Some parents were concerned that we were replacing one type of maths with another, others found this reversal positive and encouraging, a way of bringing to the surface parents existing/tacit sets of skills and knowledges, whereas others challenged the very idea of the binary itself in order to come up with radically alternatively concepts of maths and, through that very act, different ways of relating to their children through these “mathematical” contexts, discussions and actions.

Following Derrida, we can think of this deconstruction in terms of an “undecidability” or indeterminacy of the meaning of maths in the workshops. Maths begins as a method taught by schools to solve problems, which are supposed to practiced at home (i.e. homework). The workshops presented as a “subversive” mode which decentred school maths by showing its
problematic application in daily life. By “centre”, Derrida is referring to some pure, originating, idealised meaningful essence which breathes life into and sustains a fixed meaning between signifier and signified. Schools define what is to constitute “proper” or “correct” maths (i.e. that which is taught to children). However, parents also recognise that what constitutes correct maths is not fixed, as what is taught (and how it is taught) today is different to what was taught in the past. This impacted upon parents and how they relate to/interact with their children during homework as this is prescribed by schools and marginalises parental knowledge. Through the focus groups and workshops, parents questions the legitimacy and conceptualisation of school maths, and the marginalisation of parents own position in relation to school maths. Through the focus groups and workshops, parents explored the tensions and contradictions with school-maths-brought-home, it’s abstraction or detachment from the real or public world, and the “broken” nature of a system that pressurises parents to help children with homework without parents being educated themselves. Derrida explains that deconstruction is something that happens in texts, meaning that he exposes the contradictions and tensions in texts themselves in order to produce new readings, not just with regards to what something means, but how it means (self-/auto-deconstruction - exploring the dis-functionings). Each iteration of school maths reaches towards a better or more idealised form of maths (techniques which are more functional and better to learn). However, the pedagogy of teaching school maths needs to be supplemented through homework. Idealised school maths is sent home to be taught by parents who are deemed to lack the knowledge, but this supplementation by those who are deemed not to know both marginalises parents but also school pedagogy itself as insufficient at its core.

Parents 1 and 2 described problems with complexity getting in the way of disseminating a purer and simpler form of maths to their children. As discussed previously, Derrida’s notion of deconstruction works against (or rather within) binary opposites in order to undermine the authoritative position within a dualistic framework. Most of the parents who spoke to us framed their problems in terms of a lack of subject knowledge to support their children’s maths homework, or a lack of applicability of school maths concepts to out-of-school contexts. Hence, we heard many discussions between parents who described an old maths/new maths binary (echoing Parent 1’s sentiments). However, as the workshops progressed the idea of “everyday maths” displaced discussions about old maths/new maths with discussions of school maths/everyday maths. For some (such as Parent 2), the introduction of everyday maths and the suggestion that talking about and sharing mathematical knowledge not taught in schools was anti-intuitive (parents felt that they might negatively impact upon their children’s maths education e.g. by confusing them, or teaching them the “wrong” way to solve a maths problem). For others, the workshops gave parents motivation to attempt to apply school maths to out-of-school context (see Parent 3 and the rope swing example).

The excerpts from Parents 4, 5 and 6 demonstrate a movement away from “school maths” to a reimagining of the emergence, meaning, and function of maths. Or, in other words, what we see is an unexpected unfreezing or inversion of the binary opposition - rather than school maths being taken as the topic for mathematical talk in out-of-school contexts, we see creating a new identity or meaning of “maths” to share with their children. Using Derrida’s (1991) words, parents engage in “deconstructing, dislocating, perhaps even disarticulating, disjoining, putting “out of joint the authority of the “is” (i.e. the “maths”) (in Lucy, 2004, p. 13). Parent 4 achieves theorising maths as an historical entity which comes from people’s interactions with the world. This leads him to appreciate his child’s wonderment with experience and introduces mathematical concepts slowly so as to keep
up his child’s fascination with the world and not to ruin that with too much abstraction. Parent 5 takes up this theme herself turns maths into a discursive entity, concerned with labelling or categorising reality so as to aid the replication of nature. Both Parent 4 and Parent 5 invoke nature to describe their new understanding of mathematics - they move away from abstraction, perfection or “pure” maths and reimagine maths to almost be “organic”, as a relationship to and experience of nature as opposed to an idealised form. The return to “pre-maths” or raw experiences is an interesting theme of the workshop as this in itself puts into question one of the core fundamental positions of post-structuralism, i.e. that meaning or concepts come through language, and that there is no meaning outside of language. However, both Parent 4 and Parent 5 imagine a time called “pre-maths”, before maths was introduced to help us make sense of direct experience. And again, what we see is the idea that concepts emerge first, and then language is used to label concepts or observations. This is what poststructuralists would deny, and yet we can think of different levels of meaning being wrestled with. We are challenging the concept of maths (school maths) in the workshops, and getting parents to “find” the maths that they use in everyday life, so they are moving away from concepts and metaphors taught in schools towards using their experience of the world around them, and their imagination. “Nature” is introduced into discussions and this process results in the deconstruction of maths, to find something more primordial/original to (or about maths) - and this implies the recognition that school maths is historically situated. However, when thinking about language/terms (“categories” which can be named “maths”) the parents take up a structuralist view of language and see language as naming things in the world.

Finally, Parent 6 reimagined maths in terms of the nature of her embodiment and how she related to the world through her body. This example is perhaps the least “abstract” example of maths we heard - maths became an intuitive and tacit understanding of the relation between embodied self and world. And, once again parents are between poststructuralism and phenomenology. From a phenomenological perspective, first meanings are not thematically represented but enacted; it is through action that we make sense of the world, and this sense is intuitive. A phenomenological perspective asks how different environments afford alternative opportunities for engagement and learning. From a poststructuralist perspective the [embodied] subject originates nothing - meaning comes from language, and through mastery of language we learn the meaning of words and develop ideas about the world. These are two very different perspectives. The former is a philosophy about embodied meaning, the latter is a philosophy about linguistics. How do we bridge the two? Phenomenology offers us a way into the origins of first meaning prior to language (experience of things we later call maths), but post-structuralism offers us ways into theorising the destabilisation of maths as signifier/signified. The parents are somewhere between these two spaces which in some respects are incompatible. (Need to read more though).

However, regardless of whether the theory of language above introduced by parents would be agreed upon (or not) by post-structuralist (or even phenomenologists who would argue that first meanings are embodied and enacted rather than verbalised) (e.g. Merleau-Ponty, 2002), this whole idea is the emergence of a new concept for the parents and represents Derrida’s final stage of the deconstructive process, that is, the irruption of a new idea, theory, meaning or concept - something that comes out of the binary opposition (school maths/everyday maths) and something which cannot be reduced to it.
In this paper we have traced the emergence of new ideas about what maths is by (1) exploring parents’ existing binary opposition (old maths/new maths) and the new binary opposition when everyday maths is at play (school maths/everyday maths), (2) exploring the becoming of the inversion of the binary opposition (putting school maths out of play, or reducing its status as a dominant signifier), and (3) how this inversion gives rise to a new concept that could not be included in the previous arrangement - parents created a third way or new concept. In the workshops we gave examples of everyday maths and encouraged parents to “find” the maths they used in their everyday lives (e.g. whilst shopping, cooking, or travelling to school). Whilst we were not explicitly descriptive we did theorise everyday maths as being the kind of maths that people do on a regular basis. However, some parents resisted this, or at least struggle to comprehend this and instead spent much time debating the meaning of maths, the borderlines of what constituted maths (and what didn’t), and through these discussions maths became something “other”, perhaps something unique for each person (discursive, historical, embodied, etc.). These concepts of maths did not come into being out of context, but depended upon and emerged from the debates and discussions that ensued because of the deconstructive nature of the binary we provided (school maths - everyday maths).

Difference played a role here. The concept has a dual meaning: (1) meaning is derived from difference not sameness, and (2) meaning is never fully present but is always deferred, or postponed. This is a powerful double concept that can be applied to the data. In the workshops parents struggled to comprehend “everyday maths” without fixing its meaning or definition, but in that act of chasing down a definition, parents reimagined maths by moving away from abstractions to more concrete situations. A parent escribed maths as being sensual - the embodied self and its meaningful relation to the world was a site for exploring maths through sensations (swimming example: the feeling of the water, the depth, pressure, space, flow and ebb of the water etc.) A mother described maths as discursive and productive - it was a way of categorising and classifying nature in order to replicate nature (bio-mimicry, wheels, etc). In each of these examples we do not have a final definition, but a reaching. In terms of “differance”, (i) maths is defined in relation to that which it is not (it is not school maths, or it is not other school subjects), but this meaning is (ii) perpetually deferred and never grasped in its entirety. A stable signifier (a stable meaning) is never reached in the workshops. What becomes “maths” is context-bound, its identity is related to people, ideas, contexts and circumstances (which changed from person to person). “The “present” meaning of maths depended upon its relationship to what it is not. The “deconstructive reversal” happens when the hierarchy that favours school maths over parents’ maths is overturned.

Concluding remarks

In this paper we presented the findings of the Everyday Maths project. We described data which illuminated parents’ struggles with both school and everyday mathematics, and demonstrated the emergence of new concepts of maths (for the parents) and how this fed into potential maths discussions with their children. We then theorised this process of emerging ideas through application of Derrida’s deconstructive post-structuralism to the data. Following Derrida, we understood deconstruction in terms of an “undecidability” or indeterminacy of the meaning of maths in the workshops. Maths begins as a method taught by schools to solve problems, which are
supposed to practiced at home (i.e. homework). The workshops presented as a “subversive” mode which decentred school maths by showing its problematic application in daily life. By “centre”, Derrida is referring to some pure, originating, idealised meaningful essence which breathes life into and sustains a fixed meaning between signifier and signified. Schools define what is to constitute “proper” or “correct” maths (i.e. that which is taught to children). However, parents also recognised that what constitutes correct maths is not fixed, as what is taught (and how it is taught) today is different to what was taught in the past. This impacted upon parents and how they relate to/interact with their children during homework as this is prescribed by schools and marginalises parental knowledge. Through the workshops, parents questioned the legitimacy and conceptualisation of school maths, and the marginalisation of parents own position in relation to school maths. Through the workshops parents explored the tensions and contradictions with school-maths-brought-home, it’s abstraction or detachment from the real or public world, and the “broken” nature of a system that pressurises parents to help children with homework without parents being educated themselves in new school maths.

We argue that Derrida’s notion of deconstruction and its related terms (binary opposition, difference, etc) are helpful for making the parents transition to new concepts of maths intelligible. What is noticeably absent is an intersectionality which brings phenomenology to theorise this deconstructive process further (i.e. the way in which embodied, lived experience also casts maths in a new light, making it “less cognitive” or less abstract and more visceral.). The next revision of this paper will explore these issues.

References


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