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Navigating the risky terrain of children's working theories

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Abstract

'Working theories' encompass children's theorising about the social and material worlds. This article looks explicitly at power relations involved in pedagogy around children's working theories by focusing on the teacher's control of what and whose working theories get unpacked and extended. From an analysis of four cases from early childhood education (ECE) settings, it is concluded that teaching strategies are related to possible risks of unpacking and extending children's working theories. From a teacher perspective such risks include: undermining the ECE setting's rules; exposing one's own lack of knowledge or skills; or risking the relations and atmosphere in the group or setting. These risks affect how working theories are dealt with in terms of time – right away, later or never – and voicing, as teachers regulate children's ideas for example through making concrete, reconstructing or silencing them.

Keywords: early childhood; working theories; pedagogy; teaching strategies; power

Introduction

In many countries, there is consensus that early childhood education (ECE) pedagogy should build on children's needs and interests, an approach often referred to as 'child-oriented'. Key aspects of child-oriented pedagogy are that children's theories about the world are valued on their own and not compared with adult ways of understanding, and that adults need to decode and build on children's theorising (Sommer, Pramling Samuelsson and Hundeide, 2013) to extend children's thinking. When discussing child-oriented pedagogy, one useful concept is 'working theories', which stems from *Te Whāriki*, the Aotearoa New Zealand curriculum framework (Ministry of Education, 1996), where it is described as related to children's developing learner identities (Claxton, 1990). The 'working theory' construct encompasses the notion that children have ideas that are being worked on over time, in their everyday experiences with people, places and things. These theories 'become increasingly useful for making sense of the world, giving the child control over what happens, for problem solving, and for further learning' (Ministry of Education, 1996, p.44). In this article, we draw on the description of working theories provided by Hedges (2008), that is 'the ways children process intuitive, everyday, spontaneous knowledge, use this to interpret new information, and think, reason and problem solve in wider contexts' (p. 284)

A number of researchers have explored children's working theories in various guises such as 'mini-theories' (Claxton, 1990), 'islands of interest' (Davis, Peters and Duff, 2010), and

'working theories' (Claxton and Carr, 2004; Davis and Peters, 2011; Hedges, 2011). This body of research provides important insights into theories of knowledge, cognition and dialogic teaching approaches important to extend children's thinking. Though we draw on Hedges' (2008) description herein, we recognise that contemporary thinking about working theories is in transition, due to the body of recent publications employing a wide range of theoretical perspectives and concepts drawn from constructivist (Hedges, 2008), sociocultural (Davis and Peters, 2012; Hedges and Jones, 2012; Peters and Davis, 2015), complexity theories and the work of Deleuze (Hargraves, 2013, 2014), Piaget (Lovatt and Hedges, 2015), and Vygotsky (Hedges, 2012). Hence, any shared understandings of working theories are elusive given that they are shaped by the different perspectives employed. Consequently, in this article our understandings of how working theories evolve in time are shaped by our attention to power relations.

How children express their working theories and how teachers recognise, support and enrich them are well covered in more than 30 peer reviewed articles and book chapters published mainly in the last five years, a selection of which are referred to herein. This work is highly relevant beyond the Aotearoa New Zealand context as, at least throughout the Western world, early childhood teachers are charged with recognising and responding to children's learning starting with children's interests. The studies provide a vocabulary for teaching strategies related to children's working theories, for example *responding to, extending* and *complicating* (Hedges, 2011) as well as *disrupting* and *providing spaces for uncertainty* (Peters and Davis, 2011). In their research Peters and Davis (2011) found that adults often assumed that they shared the child's thinking only to *disrupt* children's working theories by making assumptions or not fully grasping children's developing thinking about particular topics. Or adults were quick to provide children with answers or solutions rather than *providing space* for them to find out more information and revise their theories, or to work things out for themselves. Also Hedges (2011) found that many of the teachers' strategies were about waiting before offering a resolution to children's inquiries, for example by *not supplying a direct answer* to children's questions.

However, there is limited research addressing *what* type of working theories teachers select to unpack and extend, and even less literature addressing *why* they select the things they do. Seeing that power is operating whenever a teacher chooses to acknowledge and build on a child's comment or action, and that some of what children say and do is never noticed and some is silenced, we find it crucial to employ a power perspective on this issue. We have seen little in-depth discussion of power in the existing working theories research literature. When power is mentioned, as when Davis and Peters (2011) point out that power shifts in teacher-child

conversations, and that teachers sometimes "hijack" (p.12) the direction of children's theorising, the critical issue of power in terms of pedagogy is not fully explored.

Hence, this article seeks to contribute insights to teaching around working theories by drawing attention to the mechanisms regulating what and whose working theories unfold in ECE settings. Here we operationalise 'power' as teacher control over *voicing;* that is, if/how children's working theories are valued and reified by teachers, and *time*; that is, if/when teachers handle children's working theories. We also use *risk* (of unpleasant consequences) as a concept to interpret how children's working theories are unpacked and extended by teachers. These concepts will be elaborated below, as they are central to our research question: *How do the factors 'voicing', 'time', and 'risk' interact with ECE pedagogy in the terrain of children's working theories?*

Power relations in pedagogy around working theories

Regarding pedagogy in the terrain of children's working theories, one crucial issue is the power relations involved in the control of when, where, and about what to communicate. In order to uncover such power relations, we see Bernstein's (2000) concept of 'framing' as fitting, since it refers to the control over communication. Bernstein speaks of two systems of rules that are connected to framing. The first is the system that concerns the social life and 'regulative discourse', such as expectations of conduct, character and manner; and the second is the system that concerns the 'instructional discourse'; such as selection (what to teach), sequence (in what order), and pacing (how fast).

Controlling if and how children's working theories may unfold

Since 'framing' embraces the control over selection, sequence and pacing, the concept offers a way to talk about how working theories unfold in time. What regulates when it is time to start/stop/continue a conversation where working theories are at play, and thus if and when to, temporarily, resolve the issue connected to the working theory? And what rules of social order might be involved in such regulations? Bernstein (2000) argues that, even though teachers often claim that they distinguish between transmission of skills and transmission of values, the instructional discourse is generally embedded in the dominant, regulative discourse. Employing Bernstein's perspective on teaching around children's working theories implies that the teachers' selection, sequencing and pacing of working theories-related communication is embedded in the expectations of conduct, character and manner of the ECE setting.

Such conditions are indicated in Alasuutari's (2014) study of preschool teacher-parent conversations revolving around what children had previously said about life in the preschool

(we note that children were not present during these conversations). Alasuutari concluded that if children's comments were to be validated by adults, they needed to fit with ideas of the ECE setting being a well-functioning institution staffed by teachers who had mastered their professional role. The adults appreciated children's comments that included fantasy stories, and stories of daily activities such as singing and playing. These responses were constructed by the adults as 'amusing' or 'lovely'. However, if the children talked of bullying or complained about the preschool, their talk was often refuted by the adults. Alasuutari (2014) interpreted such complaints as compromising, or putting at stake either the teacher's professional role, or the image of the preschool as a well-functioning community, and teacher-parent relations. In such situations parents and teachers often co-constructed a more favorable story, invalidating the child's comments.

Documenting children's working theories

Another aspect of power relations involved in unpacking and extending children's working theories concerns documentation. Out of all that children say and do, what do teachers make concrete through photos, videos, pictures, stories or quotes? Wenger (1998) refers to 'reification' as the process of giving concrete form to an abstract understanding; as in writing something down (such as rules), naming an abstract phenomenon (such as 'gravity'), or producing tools or pictures (such as maps). When something is made concrete and public, people can start to negotiate its meaning. Claxton and Carr (2004) tie the concept of reification to Learning Stories, a form of narrative assessment commonly produced in Aotearoa New Zealand ECE settings (Carr, 2001; Carr and Lee, 2012). Claxton and Carr (2004) argue that 'such reifications make concrete and visible for the student and the family the kinds of responses that the teachers find valuable' (p.94), which we read as pointing out the teacher's power over what parts of children's learning to document.

Even though visual documentation – video, photographs and drawings – is (increasingly) common ECE practice, there are few examples in research that employ critical perspectives on the power relations involved in documentation. One exception is found in the Sparrman and Lindgren (2010) study, in which the authors highlight that documentation is not simply about objectively writing down 'what children say', or videoing/photographing 'what children do'. They argue that teachers are involved in interpreting and choosing what to document or voice. Thus, the power relations of documenting children's learning can be tied to Bernstein's (2000) terms of controlling the selection and sequencing of teaching, and the idea that children's communication needs to be produced within the preschool's regulative discourse in order to be acknowledged by teachers (Alasuutari, 2014).

Methodology

In order to answer our research question about factors that interact with teaching in the terrain of children's working theories, we needed empirical material that included teachers responding to children's theories about the surrounding world. The four cases presented here are selected from data sets of our respective research projects. In the Aotearoa New Zealand project, children's theorising about social relations, specifically diversity and fairness, was under investigation. This was conducted as case study where data was collected in one ECE setting, with Kelly as a participating teacher-researcher. The Swedish project had a research focus on science teaching, thus it was more inclined towards children's theorising about the material world. Here data was collected by six researchers, including Areljung, from 14 preschools. The reason to select from both data sets was that we wanted to cover a 'wide terrain' of practices when it came to the substance of children's working theories, thus including theorising about social relations as well as science content knowledge. Our aim is not to compare ECE in our two countries, rather it is to contrast different cases of pedagogy in the terrain of children's working theories. Nevertheless, we provide a brief description of the two contexts where the empirical material was generated, drawing from an overview of Swedish and Aotearoa New Zealand ECE, developed by Margrain and Mellgren (2015).

Early childhood education in Sweden and Aotearoa New Zealand

Margrain and Mellgren (2015) identify that both Sweden and Aotearoa New Zealand have relatively high ECE participation rates (around 80-95 per cent of children in the age group 1-5 years attend some form of ECE), and a high level of teacher qualifications, compared to other countries. In Sweden, the teacher-child ratio is 1:5, while in New Zealand the ratio is 1:5 for the youngest children and 1:10 for children over 2 years of age.

For the purpose of this article, it is of interest that ECE in both Sweden and Aotearoa New Zealand have as a main goal to support children's positive images of themselves as learners and confidence in their autonomous thinking, where pedagogy should be attuned to children's own theories (Swedish National Agency of Education, 2011; Ministry of Education, 1996).

Data selection

As this study focuses on how teachers respond to children's working theories, one criterion for the selection was that the case material for each vignette consisted of observations in practice where we judged that working theories were operating, and where both teachers and children were involved. We recognise, since children are theorising (otherwise known as making sense of the world) all of the time (Ministry of Education, 1996), that in the selected sequences there are likely to be several working theories intertwined or operating in tandem about different topics. Following Hedges' (2008) definition of working theories, we have singled out one of

these topics, and built the case around the related teacher-child interaction. Furthermore we chose cases that included interviews with teachers reflecting on such sequences. In order to have a wide-ranging set of data to draw on when analysing factors that affect teachers' responses to children's working theories, we selected cases that were different from each other, both when it came to the sensitivity of the potential working theory, and the setting of the case. The four cases include a series of experiments, a reading-aloud session, a play episode and a conversation between children and their teacher. Despite originating from two different countries, we have seen that all four cases illustrate situations common to ECE settings in both of our projects.

Ethics

The Aotearoa New Zealand project received ethical consent from The University of Waikato Faculty of Education Research Ethics Committee whilst the Swedish project followed requirements formulated by the Swedish Research Council (2011). Both projects involved ethical considerations involving informed consent, confidentiality (including pseudonyms for children, adults and settings) and the use of data. Staff, children and guardians were informed about the purpose of the studies and extended the right to refrain from participation.

Analytical tool: themes and categories

The selected data consists of four cases including observations in practice (video, photos and field notes) and transcripts of interviews with teachers. Through an iterative process of individual and joint analysis based on an analytical tool (see Table 1), this data was condensed into the four vignettes presented in the findings section. Each vignette begins with an outline of the topic that we believe the working theories revolve around, from our joint perspective.

We have employed analytic coding, which implies an interpretative stance, with themes stemming from both literature and the data (Cohen, Manion and Morrison, 2011). From the outset we agreed that our analysis should build on concepts from the working theories research literature regarding teaching strategies. We were also determined to acknowledge the power relations involved in teachers' responses to children's working theories. Here, power is operationalised as teachers' control over voicing, and the 'time-being' of, children's working theories. Our respective data sets include sensitive topics such as racism and exclusion. As we discussed the cases, prior to systematically analysing them, we also realised that the 'risk' (of unpleasant consequences) was a factor likely to affect how teachers responded to children's working theories. Thus, we have concentrated on four themes when analysing the material:

Teaching strategies

Several concepts related to teaching strategies can be extracted from the various research publications on working theories. We have selected our categories from articles related to two large and influential research projects, where the concepts *not supply direct answers, respond to, extend* and *complicate* originate from Hedges (2011) while *disrupt* and *provide spaces for uncertainty* can be found in Peters and Davis (2011). We have added the category *unpack* to address the act of trying to find out what the child's current working theory is.

Voicing

This theme concerns how teachers value and give voice to children's working theories. Here we have drawn the categories *refute, validate, and appreciate* from Alasuutari (2014), and *reify* and *make public* from Wenger (1998).

Time

Peters and Davis (2011) speak of 'spaces for uncertainty'; spaces where questions and theories unfold and linger over time, without it being necessary for teachers to immediately provide the 'right' facts. Similarly, 'time' in this article refers to how children's working theories linger in time – if they can be revisited in another moment, on another day, or if they are handled right away. Linking to Bernstein's (2000) idea of 'control over pacing and sequencing', we are interested in the teacher's control over how working theories are handled in a time perspective. Here the categories, for example 'immediately' and 'fizzling out', stem from the data.

Risk

In ECE research, 'risk' generally refers to (physical) risk-taking in terms of physical challenges, such as climbing trees (See for example Stephenson, 2003; and Kelly and White, 2012). Alternatively the concept is defined as: 'the possibility that something unpleasant or unwelcome will happen' ('Risk', n.d.). Such risk is not exclusive to physical harm, but could also relate to social unpleasantness. This has some bearing on a proposal by Lovatt and Hedges (2015) that extending children's working theories can involve 'invoking disequilibrium', especially when different ideas are in conflict – for example the child experiences discomfort – and might lead to teachers and children avoiding to unpack conflicting ideas. These authors use disequilibrium mainly when conflict is perceived *within* the individual child, as she or he processes new information that confuses their former explanation.

In contrast, we see that teachers might avoid unpacking working theories for reasons other than causing unpleasantness within a child. For example, their avoidance may relate to working theories that touch upon sensitive subjects or 'difficult knowledge' (Britzman, 1991), which

could be uncomfortable for the teacher to handle and may cause tension within the group. Hence, we find 'risk' to be a powerful concept to use when interpreting the four cases. Thus, we have studied the cases, asking what could possibly be at risk when or if the teachers unpack children's working theories. The categories have stemmed from our interpretation of the data.

Table 1: Analytical tool – themes, guiding questions and categories.

Themes	Teaching strategies	Voicing	Time	Risk
Guiding question	*How are children's working theories handled by teachers?*	*How do teachers value and give voice to children's working theories?*	*When is the working theory handled?*	*What is possibly at risk if the teacher was to unpack children's working theories?*
Categories	not supply direct answers, respond to, extend, complicate (Hedges, 2011) disrupt, provide spaces for uncertainty (Peters and Davis, 2011) unpack	refute, validate, appreciate (Alasuutari, 2014) reify, make public (Wenger, 1998)	From data (for example: immediately, fizzling out)	From data (for example: relationships, kindergarten rules, the teacher's role, 'correct' understandings of issues in the natural/social world)

Findings

The results, summarised in Table 2, will be presented case by case, with our analysis following each one.

Vignette 1: Where has the water gone?

In this vignette, we interpret that the children's working theories centre on how water can disappear from a glass. The Spruce Preschool is for children aged 1-4 years. Here, as in most Swedish preschools, the cloakroom is the only indoor space that parents will definitely enter, thus it is where most parent-directed information is displayed. One day I (Areljung) noticed an arrangement, with one empty glass and one glass with yellow-stained water inside and a lid on top, on a shelf in the cloakroom. The accompanying sign read 'Where has the water gone?' Attached to the shelf were three children's drawings, including comments such as 'The water snuck out here', and 'A guy has entered here and he took water and he poured some out'.

In an interview, the teacher Hanna described how this project had originated from children observing ice forming in water containers that they had placed outdoors. Next Hanna and a

small group of children (3-4 year olds) put a water container indoors, noticing that the water disappeared after some time. Then they put water in two glasses and placed a lid on one of them. Seeing that the water had only disappeared from the glass without a lid, the children made drawings attempting to explain what had happened, hence the drawings displayed in the cloakroom. Hanna mentioned that she had conducted similar activities the year before. She regretted not having time to follow up on the children's drawings and comments: 'That is a sad thing, that sometimes things fizzle out, even though you have planned to follow things up'. Furthermore she regretted lacking the time to reflect and gather information in order to move forward: 'You don't have the time to structure yourself – when to continue and how to continue'.

Analysis

Teaching strategies. Hanna offered a space for uncertainty by not supplying direct answers to why or where the water disappeared. Instead she let one investigation lead into another. She complicated children's working theories by adding material, like the glass with the lid, and questions.

Voicing. Children's working theories were reified in their drawings which were publicly displayed, accompanied by the experiment material, in the cloakroom where parents could be expected to see them.

Time. Even though Hanna did not supply children with facts that resolved the questions, her interview account indicates that she was highly active in directing the practical investigations. Her sequencing was likely affected by experiences from conducting a similar 'line of investigation' the year before. The questions relating to the phases of water evolved and lingered over a long period time, without being definitely resolved. In fact, though finding it frustrating, the teacher signaled that this question might fizzle out due to her own lack of time for pedagogical reflection and planning.

Risk. The risks were relatively few, given that Hanna had worked with similar activities before, albeit with another group of children. Still, the teacher comments that she has not had the time to gather enough information to go on exploring the phenomenon of phase transition. This can be interpreted as the teacher avoiding the risk of not knowing how to explain the phenomenon, or how to extend children's working theories.

Vignette 2: This is our house

In this vignette, we interpret that the working theories revolve around inclusion and exclusion. Beach Kindergarten in Aotearoa New Zealand is for 3-5 year olds. Here teachers often read picture books to the group of 40 children as parents are arriving to pick them up. On this day I (Kelly) observed a teacher, Grace, reading *This is our house* (Rosen, 1996). The story was about a boy with red hair, playing in a cardboard box house. He would not let other children in. First he wanted to exclude the girls, then he wanted to keep out children wearing glasses. When Grace read: 'This house isn't for people with glasses', Gabriel gasped and said in a firm voice 'Oh, that's me, that's me'. He touched his glasses and looked at his mum, who was standing near the mat and had glasses on too. After initially appearing close to tears, Gabriel said 'I'm gonna get angry at that boy'. Grace immediately stopped reading and talked to Gabriel about his feelings and the reasons behind them. Then she read on, recounting how, when the boy with red hair went to the toilet, all the children crowded into the house, shouting 'this house is for everyone'.

Later, three of the teachers talked about the incident and the kindergarten ideals of fairness and inclusion. Grace identified that she had planned to let the children ponder for a while about Gabriel's saying 'that's me', but when she saw his face she 'couldn't just leave it'. Grace commented:

> Every time I said a reason why the boy in the book was excluding the other children, it was as if some children were thinking 'Phew! I would be OK'. And then when it said 'glasses', Gabriel said 'that's me, that would be me' and his little voice cracked and he thought 'oh my god, I could be excluded!' He's just new and his mother was here too.

Analysis

Teaching strategies. From Grace's actions and comments, we interpret that she was unwilling to provide the children with space for uncertainty once she observed Gabriel's emotional response to seeing himself in the story. Instead she intervened and attempted to unpack Gabriel's working theory/theories.

Voicing. Grace valued and gave voice to Gabriel's working theories at the time and in the follow-up discussion with other teachers. Other children's potential working theories (besides Gabriel's) were not unpacked. Though recognising that children seemed relieved as long as the reason for exclusion did not apply to them, no teacher pointed out that 'girls' were another group also excluded in the book, despite almost half of the children present being girls.

Time. The picture-book followed a traditional narrative sequence with an unfolding plot, escalating tension and a resolution at the end. Grace controlled the pace and sequencing of the conversation – stopping reading, talking with the children, and starting to read again. While the story was familiar to other children, Gabriel was new to the kindergarten and he may not have heard it before.

Risk. From Grace's response, we interpret that she was not prepared to risk many things - the teacher's role, the child's well-being, the kindergarten ideals including a nice atmosphere, and 'correct' understandings of issues in the social world.

Vignette 3. Friends don't do that

In this vignette, we interpret that the children's working theories concern how a friend should behave. One afternoon in my teacher-researcher role at Beach Kindergarten, I (Kelly) observed Sachin and Ruby (both 4 years old) building in the block area. The children were crouching down when suddenly Ruby jumped up. In the process she stood on Sachin's fingers. Angrily Sachin said: 'I'm taking my car away' and he yanked a box causing the building to collapse. He fled outside leaving Ruby looking confused and upset. She took my hand and together we followed him. As we sat down near him he held up his hurt fingers.

Researcher: I can see you are upset Sachin. Ruby's upset too. She didn't mean to hurt your fingers.
(The children listened silently.)
Sachin: Friends don't do that!
Researcher: No friends don't hurt each other Sachin, but this was an accident. What do you want her to do or say? She is upset and wants to play with you because you are her friend.
Sachin: Say please! (pause) Say sorry!
Ruby: Sorry!

Together the two children returned to rebuilding their shop. I wrote a Learning Story documenting what I saw as their learning. With the teachers' support I put copies in both children's portfolios. One of the teachers commented:

> Your story is very thorough and precise. Sachin so misunderstood Ruby and I love his comment 'friends don't do that'. I think it is interesting how they have both misunderstood each other in this way. After reading your story it seems Ruby was oblivious to hurting him, he thought it was on purpose and Ruby is mortified once she

> realizes. I wonder does culture, language (verbal and body) play a part? Anyway, awesome story, great learning here and yes I think it could be put in both of their books.

Analysis

Teaching strategies. Acting in place of a teacher I sought to disrupt Sachin's (mis)interpretation of Ruby's actions. I responded to Sachin's working theory 'Friends don't do that', but did not supply a direct answer. Rather, I asked Sachin what he wanted his friend Ruby to do to resolve their dispute. I did not unpack Ruby's working theory.

Voicing. I validated Sachin's working theory about how friends should behave. His request to 'say please/sorry' was in keeping with the kindergarten rules, and pragmatics - social relational practices. The Learning Story reified the event, making it public for teachers and the children's families, and valued both children's social learning.

Time. Time was highly significant in terms of the children's communication. I clearly selected and sequenced the conversation for an immediate resolution for these angry and upset children.

Risk. I did not want to risk the children's well-being, or their relationship. My reputation was also at risk: could I (the teacher-researcher) manage, extend and document the children's working theories in a way that would reinforce the kindergarten rules, the nice atmosphere, and children's 'correct' understandings of issues in the social world?

Vignette 4: The anthill

In this vignette, we interpret that there are working theories concerning life inside, and outside, the anthill. The Ant Preschool is a Swedish preschool for children aged 3-4 years, where the parents had been asked to bring a photo showing their child's 'meeting with the forest'. These 'meetings' were acknowledged during weekly excursions to the forest, for example when the teacher Jenny and four children gathered around an anthill. It was late autumn and there was little sign of life on the surface of the hill. The following conversation took place after Jenny had told the children that the ants were sleeping inside the anthill in winter:

Teacher:	Do you think that the ants are sleeping during the whole winter?
Children:	Yes.
Teacher:	Or can they play inside the house?
Anna:	They have a laundry room where you can play
Teacher:	You think there is a laundry room inside?
Anna:	Yes.

Teacher: What do you think?
Kim: I think they have a windscreen wiper. Then you must have a car.
Teacher: You think they have cars in the anthill?
Kim: Or a big car.
Teacher: What do they do with the car?
Kim: Jump in.
Anna: Go on vacation.
Kim: To Germany maybe.
Teacher: To Germany maybe.
Anna: Where Lucas is.
Teacher: Yes, where he is. Maybe they want to go to him.
Anna: Maybe they go with bus number 4 to Germany.

Soon the group discovered a living ant on the surface of the hill and the discussion moved away from theorising about life inside the anthill.

When the teachers Jenny, Nina and Bette watched a video recording of this conversation, they applauded the children's ingenious ways of connecting their own experiences – of the bus, a laundry room, and a child who had moved to Germany – to the life of ants. When asked, by the interviewer, about the pros and cons of anthropomorphizing ants, in relation to learning science, Nina responded:

> If one puts it like this: we know that there is no laundry room in an anthill, we do know that. Because we are adults and we have developed our logical thinking. In the same time, one does not want to say to a child that 'you do understand that there is no laundry room, don't you?' (...) One does not want to take away their desire to think creatively.

Analysis

Teaching strategies. Jenny provided room for uncertainty regarding life inside the anthill, however she did so without intervening: not supplying answers, and not unpacking any working theories.

Voicing. Jenny gave voice to many of the children's comments basically by repeating them, however the tone of her voice sometimes implied a question. In the follow-up interview the teachers appreciated children's imagination and their awareness of things like the bus and Germany as a vacation destination.

Time. The quoted dialogue can be read as a rather fragmentary conversation, with no clear selection or sequencing in relation to the content (life inside the anthill).

Risk. From the group interview, it seemed like the ECE ideal included upholding children's penchant to think creatively. We interpret, from Jenny's responses in the anthill dialogue, that she was cautious not to risk this ideal, as she did not value the children's comments or lead the conversation in any particular direction.

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Table 2. Summary of the findings.

Vignette	**What the working theories revolve around**	**Teaching strategies** *How are children's working theories handled?*	**Voicing** *How do teachers give voice to and value children's working theories?*	**Time** *When are the working theories handled?*	**Risk** *What is possibly at risk if the teacher was to unpack children's working theories?*
1. Where has the water gone?	How the water disappeared from the glass	not supplying direct answers, space for uncertainty, complicates children's working theories by adding material and questions	reified in children's drawings and recorded comments, made public in the cloak room	lingers over a long time, letting one investigation lead to another, clear sequencing led by teacher, questions not resolved in the end – risk "fizzling out"	teacher not having enough content knowledge to know how to extend children's working theories
2. This is our house	Inclusion and exclusion	clear teacher intervention, aiming to unpack one child's working theories	one child's working theory validated by teacher in the conversation	immediately (though had planned to let children ponder for a while) book offers a resolution and a pre-set sequencing, which the teacher is in control of	child being upset and feeling excluded, not being seen as a nice atmosphere, or children not being taught "correct" understandings of issues in the social world
3. Friends don't do that	How a friend should behave	responding to and seeking to disrupt the working theory of one child, not unpacking that of another child	one child's working theory reified in both children's books of Learning Stories, appreciating the working theory that was in line with ECE rules, valuing social learning	clear teacher control over sequencing, seeking immediate resolution of the conflict between the children	unpleasant atmosphere, children falling out of friendship, one's reputation in the eyes of the other teachers: undermining kindergarten rules, child not learning social codes
4. The Anthill	Life inside the anthill (and outside the anthill)	not necessary to base ideas on facts, no clear teacher interventions aiming to unpack children's working theories	children's ideas appreciated, children's creativity and imagination valued	fragmentary dialogue, few follow-up comments on potential working theories, no lingering over time	taking away children's penchant to think creatively

Concluding remarks

In our judgment, power perspectives are under-explored in previous research in the field of working theories. Hence, this study explicitly focuses on power, in terms of teacher control over selecting and building on children's comments or actions, in an effort to understand the factors that matter to ECE pedagogy in the terrain of children's working theories. Based on our analysis we see that some working theories are riskier than others from a teacher's perspective, because unpacking them could expose the teacher's lack of knowledge/skills, undermine the rules of the ECE setting or be inconsistent with its philosophy. Furthermore, unpacking risky working theories could mean putting at stake the children's well-being, for example through damaged relationships, as in Vignette 3 'Friends don't do that', or a child feeling aggrieved as in Vignette 2 'This is our house'.

We propose that the riskiness affects how working theories are voiced and sequenced by teachers (see fig 1), as less risky working theories are more likely to be verbalised, made concrete and made public, compared to risky working theories. In Vignette 3, Sachin's comment 'Friends don't do that' was in line with the ECE rules and quoted in both his and Ruby's assessment documentation, while Ruby's potential working theories about friendship were not unpacked at all. In Vignette 1 'Where has the water gone?', the children's working theories were reified in their pictures, and recorded comments, and publicly displayed in the preschool cloakroom. We judge that these working theories, for example 'the water snuck out here', were perceived by the adults as rather 'amusing', in keeping with Alasuutari's (2014) finding that children's 'amusing' or 'lovely' statements were appreciated by teachers and parents. Also in Vignette 4 'The anthill', the children's comments were highly valued by the teachers, who applauded the children references to 'bus number 4' and 'travelling to Germany'. In Vignette 2 'This is our house', on the other hand, the child's comment 'I am gonna get angry at that boy', was supposedly not appreciated as amusing or lovely, but rather it seems that the teachers created a more 'favorable story' (Alasuutari, 2014) of the child's reaction, where the anger was explained in terms of the child feeling excluded. This was likely more in keeping with the ECE setting, where 'social inclusion' was one of their priorities.

When it comes to teachers' sequencing (Bernstein, 2000) of working theory-related teaching we mean that risky working theories call for quick closure, as was the case in Vignette 3 'Friends don't do that'. This quick closure can be accelerated by children's emotional reactions, for example Sachin's anger and Ruby's anxiety in Vignette 3 and Gabriel feeling aggrieved in Vignette 2, as the teachers responded to children's emotions before their working theories. Not unpacking or extending the working theories might prevent children from developing the necessary knowledge, skills and attitudes associated with social competence (Ladd, Herald and

Andrews, 2006), if we consider that children's working theories 'become increasingly useful for making sense of the world, giving the child control over what happens' (Ministry of Education, 1996, p.44).

Vignette 1 'Where has the water gone?' implies that less risky working theories can be extended over a long period of time and through several teaching moments, which is in line with what Peters and Davis (2011) call 'leaving room for uncertainty'. Less risky working theories can also be left unresolved, which is indicated both in Vignette 1, where the teacher says that the investigation of evaporation may 'fizzle out', and in Vignette 4 'The anthill', where it seems that none of the children's comments, related to life inside the anthill, were unpacked. In 'The anthill' case, the risk was connected to the act of extending in itself, since the ECE philosophy was strong on not disrupting children's penchant for creative thinking.

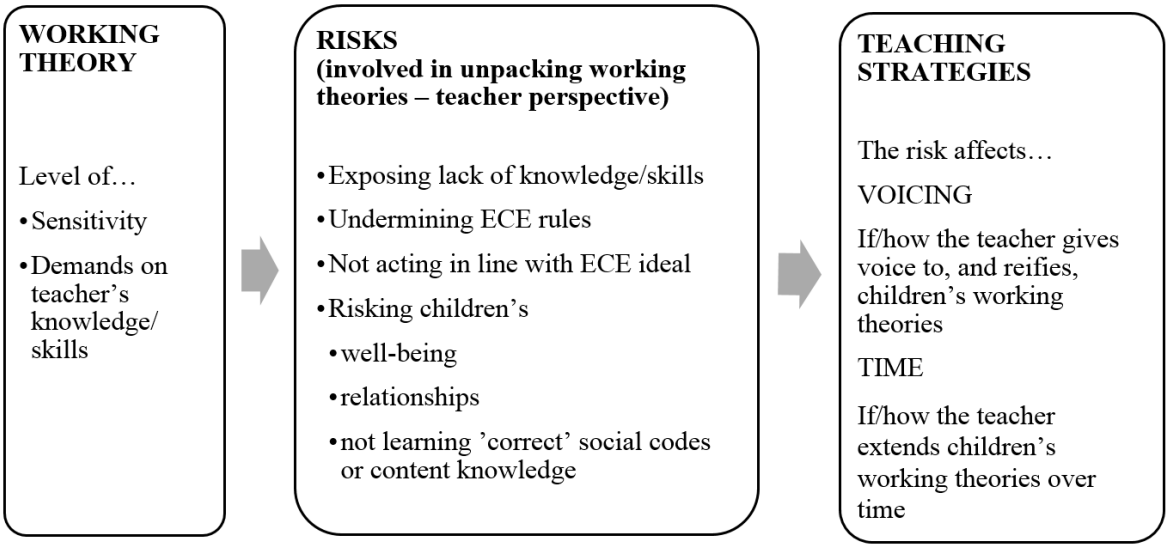

Figure 1. Relations between types of working theory and the risks related to unpacking the working theories, and finally how risk - by regulating voicing and time – interacts with teaching strategies in the terrain of children's working theories.

Despite the limitations of this collaborative project; it was deliberately engineered out of other projects and is small in scale, we see the findings having broad relevance to ECE teachers internationally. Whether or not they are familiar with working theories as a construct or a learning outcome, there is much to be gained from teachers considering the power relations in their pedagogy. This specific terrain is relatively uncharted so we offer our analysis and findings as a provocation to both researchers and teachers. Further research is needed in this arena and

the authors are continuing with this work. We also look forward to others taking up this challenge and to children benefiting from the new knowledge that is generated.

To sum up, we concur with other researchers in ECE that young children are theorising all of the time, sometimes alone and sometimes with others, as they make sense of the world. Whether their working theories get further explored, that is whether adults take up opportunities to unpack children's working theories, depends on the estimated risks of the working theory in the first instance, hence the name of this article – 'Navigating the risky terrain of children's working theories'. Our study highlights that these risks interact with teachers' voicing of workings theories, as well as how such theories are managed in time. To recognise the factors 'risk', 'voicing' and 'time', which have been shown to be linked to power, in ECE teaching around working theories are thus significant for developing pedagogy in this terrain.

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