

An exploration of the relationship between schema and language:
four young child case studies.

I am deeply interested in learning, I think I always have been and I hope I always will be. I am particularly interested in how young children learn language – a process so complex that computers have yet to be programmed to comprehend it, but one which we as humans seem to undertake as if ‘by magic’ (Gross 2013). I understand that ‘the ability to communicate – to say what you want to say and to understand what other people are saying – is fundamental to life chances’ (Gross 2013: 1) and I am conscious of the Bercow Report (Department for Children, Schools and Families (DCSF) 2008) which summarised that:

If a child receives the right help early on, he or she has a better chance of tackling problems, communicating well and making progress. If a child does not benefit from early intervention, there are multiple risks – of lower educational attainment, of behavioural problems, of emotional and psychological difficulties, of poorer employment prospects, to mental health and, in some cases, descent into criminality (2008: 7).

This statement has had a profound effect on my thoughts about the importance of early language development and shaped the path I have followed throughout my early years career, including this dissertation study. By conducting this research, through four case studies, I hope to find out more about the following:

- Are young children ‘communicating’ through schemas?
- Are children’s schemas and early language linked, or not?
- How do young children learn and come to use new words?
- How might we meaningfully support children’s language development?

I hope that a better understanding of these issues and, ultimately the relationship between children’s schema and language, might help address some of the concerns about speech, language and communication. Ultimately, I believe, like Bayley and Broadbent, that ‘each and every one of us talks with most interest and enthusiasm

when speaking about the things that are important to us' (2013: 41) and therefore I hope that through closer examination of young children's schemas and their early language use, we might be able to offer support and appropriate opportunities for important language development in a way that is meaningful to each child.

To compile these case studies, I completed naturalistic observations (Mukherji and Albon 2015) of the children in their nursery environment, incorporating a five-minute video observation once they each appeared 'deeply involved' (Laevers 2000) in their learning, or concentrating without distraction. I then used these observations as prompts for discussion about the children's learning, during semi-structured interviews (Mukherji and Albon 2015) with each of the children's parents and their key person (Elfer et al 2012) within the nursery. I have applied existing literature regarding schema and language to help make sense of our (parents', professionals' and my own) initial understandings and identified key themes across the learning. Alongside these observations of children and interviews with their parents and practitioners, I also kept a research journal. Like Arnold I 'kept a journal of anything that occurred to me, after observing the children directly, or after discussing with workers or parents or when revisiting video observations' (2007: 142). I have found this to be hugely beneficial throughout the process of data gathering and 'sense making' (Arnold 2007), as themes began to emerge.

I subscribe to the notion that ethics are the moral compass which helps guide researchers through a project and have adhered to McNiff and Whitehead's (2011) three aspects of ethical consideration: negotiating and securing access, protecting your participants, and assuring good faith. I sought verbal consent from both adult and child participants, confirming this with a suitable letter, as I subscribe to the practice of 'ethical symmetry' (Christensen and Prout 2002), whereby children and adults are given equal ethical consideration and the principles of ethics remain the same, but differences in participants' abilities are accounted for.

I considered participants' continuing consent (Roberts-Holmes 2014) by: observing children closely for both verbal and visual signs that they may be uncomfortable or wish to withdraw from the observation and responding accordingly; I 'checked in' with parents and practitioners at significant points throughout the research process;

and I asked each adult participant to 'member check' (Stake 2010) the final case studies for accuracy and let me know if there was anything they wanted to edit. All participants also chose their own pseudonyms, used throughout, which I believe is more respectful than using numbers or letters to maintain anonymity as McNiff and Whitehead (2011) suggest.

The integrated early childhood centre in which I work has developed through a process of democracy and across the organisation there continues to be a strong focus on the importance of involvement (Fletcher 2014). Since its beginning over three decades ago research within the centre has been, and continues to be, co-conceptualised, co-designed, and co-developed (Whalley 2014) alongside families and it was important to me that I continued this tradition. It was essential that parents and practitioners felt included throughout the research process, and particularly when identifying the findings, recognising that through collaborative research we could collectively find out about any relationship between schema and language. I hoped to minimise any issues of power by valuing these 'multiple perspectives' (Cherryholmes 1993), from people who knew the children best (Whalley 2017), and allowing the development of power *with*, rather than power *over* others (Follet 1924).

When considering young children's learning I utilise schema theory (Athey 1990) as an appropriate 'lens' (Bruce 2015) through which to develop an understanding, alongside others, about children's cognitive and emotional concerns, in the hope that we can support them to start to make sense of the world around them. Piaget (1936) first referred to schema as 'units' of information young children gathered about the world, which were updated (assimilation) and refined (accommodation) in line with new experiences (disequilibrium) or developing understanding (equilibrium). Later he referred to 'schemas of action' or 'co-ordinated systems of movement and perceptions... capable of being repeated and applied to new situations' (Piaget 1962: 274). Building on these ideas, Athey defined schemas as: 'patterns of repeatable actions that lead to early categories and then to logical classifications' (2007: 49), which I concur with.

Mercer (2004) linked this to children's development of language in that, when children experience disequilibrium, or 'cognitive conflict', it is likely to be mediated by

accompanying language. He states: 'language provides a means for resolving [cognitive conflict], by engaging in some joint thinking with an adult' (Mercer 2004: 124). I am particularly interested in this relationship between schema and language – the cognitive aspect and the role of the accompanying adult. Atherton and Nutbrown refer to the adult's role too, stating that 'careful observation by practitioners can be used to understand and support future learning encounters through... practitioners developing a schematic pedagogy which focuses on structures of children's thinking' (2015: 63). The concept of 'schematic pedagogy' links closely with Athey's (2007) thoughts about constructivist teachers and Arnold's belief that we can support children by comprehending 'the learner's current understanding, particularly when it comes to very young children, who may not yet be able to guide us with their questions' (2015: 728). This too, is how I was beginning to consider the relationship between children's schema and their language development.

Although I have always been interested in children's language development, schemas are something I kept being drawn back to. I began to wonder if the link in my interest, and the two concepts, was that they are both symbolic. Whitehead suggests we should have a 'keen awareness of the role of play in infant communication skills and early language, and in a most significant form of human thinking – the symbolic' (2001: 18), adding that 'symbolic thinking... is essential when we need to think about difficult and abstract ideas which cannot be touched, tasted or pointed to' (2001: 19). Although this is a reference to language and literacy – shared symbols (words, letters) needed to exchange ideas – I was beginning to think about children's schemas in this way too. This appears to be a connection made by Deguara and Nutbrown too; they state that 'schemas often feature in young children's actions and drawing where they include signifiers of actions, which they gradually co-ordinate into more complex schematic relationships, often representing more complex thought' (2018: 5).

Piaget and Inhelder state: 'the function of schema is to enable generalizations to be made about objects and events in the environment to which a schema is applied' (1973: 382), but what if it said: the function of *language* is to enable generalisations to be made about objects and events in the environment to which a *symbol/word* is applied? I have often heard schema theory referred to as another 'lens' through

which to view children's learning (Bruce 2015) - but what if we re-thought about it as another language? A way for children to communicate their thoughts, feelings and understanding about the world around them? Bayley and Broadbent suggest that, to support early language development, 'children need access to adults who really value what they have to say about their child-initiated learning and who make time to listen to them' (2013: 44) and schema theory offers practitioners an alternative way of 'listening' to young children. Indeed, Arnold refers to utilising schema theory to 'try to interpret' and to 'come to a closer understanding of' (2015: 727) her pre-verbal granddaughter's intentions; something I hope to have emulated here.

In carrying out these four case studies I have focused on the development of children's spoken, or expressive, *language* in the form of their *speech*. I have considered whether we might consider children's schematic interests as an alternative form of *communication* regarding their cognitive and emotional concerns, providing further understanding that we might use to support traditional language development. Although there are a number of theories (Chomsky, 1986; Vygotsky, 1986; Piaget, 1962) unfortunately, we 'do not know exactly how children learn language' (Macleod-Brudenell and Kay 2008: 165), as with schematic pedagogy however, we do know that adults have an important role to play. Routines, shared with familiar people, provide an important first step in learning language and, as Piaget (1962) suggests, through these recurring experiences children develop schema (a mental image or collection of ideas) used to organise existing knowledge and make sense of new experiences.

Learning to play with a ball provides a good example of the way that children's 'schemas' for objects and events are developed. Children need to touch, smell, roll, drop and throw a ball to develop the concept of 'ball'. Part of this concept includes the sound of words that are used by familiar adults when playing with balls... Most of this learning occurs when children play regularly with a consistent partner (Bochner and Jones 2003: 12).

The above explanation, which refers to physical, social and cognitive aspects of learning language, fits very well with my own thoughts. Although Hart and Risley's (1995) much-referenced work on the 'word gap' claims that children's 'exposure' to

language at home is most important, I align my views with those who challenge this notion (Johnson 2015) and suggest that for children to learn and use new language it needs to be relevant to them and their current experiences.

The following case studies refer to four children (pseudonyms used throughout): Robert, Ethan, Annie and James. Following each of my observations I engaged in reflective journaling (included in italics) and was surprised by how much of an emotional connection to each of these children I made in such a short, focused space of time. This was also recognised by Tait et al, during the development of 'consultancy observations', when they noticed that: 'participants seemed to feel a real emotional connection to the child they were observing' (2018: 142). They also found that 'several of the participants spoke about how they believed the particular study child knew that they were being observed and that the observer was "there for them"' (Tait et al 2018: 142) which is certainly, but unexpectedly, how I felt.

Robert (aged two years two months) demonstrated a keen interest in water play, spending time filling different sized containers either from the tap or by submerging them in water. Interestingly he never seemed to fill containers completely and, often, after filling them, he would pour the contents out immediately and start refilling them saying "more water". I wondered if this was a comment he had heard previously and accommodated (Piaget 1962) into his own vocabulary; on occasion I noticed practitioners playfully asking 'not *more* water Robert?' as he returned to the tap. Schematically Robert seemed to be interested in containing and, also, scattering the water. In an earlier observation, Robert spent time selecting all the smaller sea creatures from a box, discarding larger or non-sea creatures. He contained these creatures in a plastic jar and then used the tap to add water. Realising there was still space left in the jar, he returned to add more small sea creatures. Robert used very little language during this sequence of events – he seemed truly engaged, in a personal state of 'flow' which Csikszentmihalyi defined as: 'a state in which people are so involved in an activity that nothing else seems to matter' (1990: 4).

When I met with Robert's mother and key person I shared my thoughts about the container of sea creatures, which reminded me of the proverb about a jar filled with rocks which looks 'full', until you add pebbles, which 'fit in' around the rocks and

make it 'full' again, until you add sand which also 'fits in' around the stones and makes it 'full' again, until you add water which 'fits in' still. I considered Robert's family situation, a new little brother to 'fit' alongside, and wondered if he was trying to understand the emotional 'space' that is available for him now. Jane and Sue both agreed this was an interesting concept and maintained that Robert is very interested in relationships at present.

Robert further demonstrated his interest in sorting and classifying different objects (Arnold 2003) during a later observation, where he sorted 2D shapes into groups of squares, triangles and pentagons – the latter of which he referred to as "a circle". During this activity Sue introduced the word 'pentagon', counting the five sides of the shape for Robert. On this occasion however Robert appeared not to have the necessary conceptual understanding and did not accommodate or begin using the new vocabulary introduced, despite the fact that it was relevant to the situation. Jane confirmed that, at home, Robert correctly recognises and names squares, triangles and circles; demonstrating his existing conceptual understanding or schemes of thought (Piaget 1962).

'Whilst waiting for snack I spoke to another child and Robert came right up to my face and met my eye for a few seconds – I felt certainly he was silently questioning my allegiance to him... later, when a practitioner took another child's boots off him, Robert again met my eye and seemed to appeal to me for back up... I am intrigued by the emotional connection I am feeling after only a few half hour observations'

Ethan (one year eleven months) focused on resources in the messy play area, often engaging in sand or water play. It was clear this area offered him comfort, alongside a strong relationship with his key person and I was interested in how he seemed to seek out opportunities to contain during the initial transition from home. During later observations Ethan became comfortable enough to talk about his absent mother, asking "mummy, where mummy?" and replying "no, home" when I asked if she had gone shopping. I was interested in this connection, considering the link between schemas and emotions (Arnold 2010) and Mercer's (2004) thoughts about language helping with children's cognitive conflicts. Ethan seemed able to regulate

his emotions through the schematic action of containing (Arnold 2010) and was then able to use his emerging language to verbalise his internal, emotional concerns and seek comfort in addressing these. Whitehead agrees that 'language creates and extends our ability to think about abstract and complicated ideas' (2001: 10), such as, in this instance, absent parents. Ethan spent long periods of time over-filling and emptying containers, he began to develop his understanding of capacity as he transferred sand or water from different sized containers, often lifting the empty container to look inside, seemingly silently questioning 'are you empty now?' Reflecting on this, in relation to Robert's observations, it might have been an appropriate time to have introduced the words 'empty' and 'full', however I did not. Stewart suggests that 'it is challenging to be effective as a conversational partner and co-thinker with young children, and we all have occasions where our approach misses the mark' (2011: 89). I was interested in Ethan's understanding of the different concepts associated with this type of play – full and empty, heavy and light, here and gone – and how these may have reflected some of the emotions he was experiencing upon separation. I wonder if offering some of this vocabulary might have supported Ethan's thinking? Brock and Rankin suggest that 'even before they can talk in words children are keen to share their ideas through sounds, gesture and body language... [and that] talk helps children understand what they experience' (2008: 9).

During one observation Ethan emptied a container of toys before submerging it in the water and trying to lift it out again. Kate commented "that's heavy!" as he struggled to lift it. A little while later another child tried to pick up the container and Ethan exclaimed "my heaby!" [*sic*] as he looked at Kate to retrieve it. It seemed he had accommodated (Piaget 1962) the significant language, even if he did not use it entirely accurately. Mercer (2004) suggests that we 'appropriate' ways of using language through interaction with others and that, for children, like Ethan, 'recycling' language heard may be an important way of assimilating collective ways of thinking about the world around them. This idea links to Matthews' (2003) thoughts about the language offered to children by parents and practitioners acting as a 'pivot' to group together repeated experiences in the brain and help children to form early concepts. It would seem Ethan was beginning to develop his understanding of the concept of 'heavy' at the same time as Kate providing the word. This experience demonstrated

a link between two important, but abstract, concepts about the world that Ethan seemed to be grappling with – the weight of items and his connection to objects and other people.

‘When I arrived Ethan was with Mum. We moved to the corridor and Ethan kept looking over at me and back to Mum. As Mum left Ethan was still very wary of me. I wonder how I can build a relationship whereby Ethan trusts me enough to play ‘as normal’ without getting directly involved in his play – or whether this is even necessary?’

Annie (aged three years nine months) was very interested in both containing and transporting, a cluster of schemas (Athey 2007) evident throughout the role play scenarios she enacted. During these I noticed Annie narrate her play, saying: “I close the curtains” and “I make cereal”. This links to Vygotsky’s (1986) thoughts about ‘private speech’, which he suggests children engage in from around three years old, as a link between social communication and internal thought – essentially a child’s thoughts spoken out loud. Private speech has also been linked to accompanying children’s activities and enhancing imagination, as I believe Annie was using it here. I began to wonder if further observation, really ‘tuning in’ to children’s private speech, alongside the application of schema theory, might further support our understanding of children’s emerging thoughts about the world.

Building on learning observed in Robert and Ethan’s case studies, it was evident that Annie had started to use some of the language introduced to her relating to space and capacity. During one important observation Annie used this to her advantage; she packed a small rucksack, then removed the items one by one, identifying what they symbolised, and returned them to the rucksack. As she was re-packing her friend added an item and Annie looked unimpressed. With the additional item inside Annie struggled to do the zip up and contain the items sufficiently. I asked her if it all fit and she replied: “*this* doesn’t fit” identifying the item added by her friend. She removed the unwanted, additional item and, looking satisfied, she was then able to successfully do up the zip and contain all her items.

'I told Annie I had to go back to work and would see her next week. She replied: "see you next week!" I was pleased with our interactions. I wondered if it was the time or the place that had affected how chatty and comfortable Annie seemed?'

James (aged three years eight months) demonstrated a strong interest in trajectory and during one observation he and a friend spent over five minutes going up and down the slide, at first together and then racing each other. His mother and key person confirmed that James is very competitive and, during this same observation, after he came last down the slide, I noticed James shout "first one to the gate is the winner!" as he ran towards the gate. This demonstrated an important connection between James' schematic interest in a trajectory action and the possible language associated with it. As he develops his understanding of line, both stationary and in motion, James is beginning to recognise and use some important language relating to mathematical concepts, such as number and order. Arnold recognised similar connections as she observed her grandson: 'Harry initiates many actions that help him to understand his world... he uses the mathematical signs (like numbers), practices (like using the phone) and words (like 'on top', 'behind' and 'before') with which he is familiar to understand emergent mathematical ideas' (2003: 93). Arnold (2003) also refers to Piaget's (2001) idea that thought is children's 'internalised actions', which made me begin to wonder whether James' actions, and those of the other children in these case studies, were therefore their *externalised* thoughts, providing us with an opportunity to offer relevant and meaningful language to support children's development.

In a later observation, and as an example of schematic pedagogy (Atherton and Nutbrown 2015), James was provided with pens and paper to draw smaller lines and create an invitation. He provided me with an animated description of the dinosaur party in London that he had invitations to, showing me the lines on the paper proudly. As Bayley and Broadbent suggest: 'child initiated learning offers such a wonderful context for supporting, developing and extending talk... when children take on the responsibility for organising their own learning they will engage with things that interest them... [and] talk will flourish (2013: 41). This example demonstrates how schematic pedagogy (Atherton and Nutbrown 2015) –

practitioners who are tuned into children's interests – can support children's cognitive and language development.

'When I arrived I asked Carol where James was and, as she pointed, he came running across the room. He gave my leg a big hug and said: "I like your yellow shoes", I replied "thanks, they're new!" It felt like the exchange of old friends! I was pleased in the relationship we were developing...'

There is a strong theme relating to children's 'thinking' or 'thought' running through each of these four case studies. In terms of the relationship between schema and language this appears to be the connecting factor. Children's action schema (Athey 2007) reflect their emerging and developing thoughts about the world around them, including complex concepts such as 'here and gone'. Children develop their thinking by repeatedly engaging in these actions which 'lead to early categories and then to logical classifications' (Athey 2007: 49). Language offers children a socially-constructed method of labelling these thoughts about the world around them, but 'these symbols have no meaning in themselves', they must be 'socially learned' (Hayes 2016: 9). This supports the social-constructivist view that children learn language through conversation and experience, however a criticism of this theory is that children would only ever learn what we, as adults, wanted them to know. Instead Gross suggests that 'adults who take their lead from the child have a more positive effect on language development than those trying to direct the child' (2013: 17). This is evident when Sue tries to introduce the word 'pentagon' to Robert; although it is relevant to the situation, it appears that he is not interested in the concept and therefore does not accommodate (Piaget 1962) the new vocabulary.

Throughout these observations children appeared to accommodate (Piaget 1962) new language when it related to their current thinking or troubling thoughts – often reflected in their schematic play – and it might be suggested, therefore, that language supports equilibrium (Piaget 1962). Atherton and Nutbrown suggest that viewing children's actions through the schema lens 'enables adults to accompany children as they explore and investigate in a way which attunes to their *forms of thinking* and so provides a match for their conceptual concerns' (2013: 4) – we saw this accompaniment when Kate offered Ethan the word 'heavy' for example, at a time

that it matched his physical and conceptual understanding. Hollich et al (2003) refer to this as 'word-to-world mapping' when describing the different ways in which children learn words. Atherton and Nutbrown suggest that 'an informed understanding of schemas gives practitioners insights into the richness of children's thinking and helps adults to be thought-provoking in a relevant way as they unite with children on their learning journey' (2013: 23). Although, as evidenced by my 'missing the mark' with Ethan, this is not always the case – by not offering the language relevant to his interest in containing at times of transition, I demonstrated that I was not truly united with him.

If thoughts are children's internalised actions (Piaget 1962) then perhaps action schema (Athey 2007) are their earliest thoughts externalised. Previous researchers have referred to schemas in this way – Athey as 'systems of *thought*' (2007: 153) and Nutbrown (2011) as 'threads of *thinking*'. Atherton and Nutbrown made the same connection between the thoughts and actions of very young children who 'learn with their whole bodies and all their senses, [who] are *physical thinkers*' (2015: 65), they summarised:

through the lens of schematic theory, those working with children can reflect upon and shape their practice... to provide a cognitive match in learning encounters... [allowing] accompaniment in learning to be a relevant and pertinent occasion which affords children the respect they deserve (2013: 91).

I was pleased to observe how 'attuned, matched learning encounters between adults who have a knowledge of schemas and are aware of children's particular schemas [was] highlighted, with the importance of a conceptual response to children's *patterns of thinking* revealed as they played' (Atherton and Nutbrown 2013: x). I have realised the opportunities that conceptual tuning in (Atherton and Nutbrown 2013) offers practitioners with regards to suggesting appropriate language, which is relevant to the individual child and therefore likely to support overall development through the accommodation (Piaget 1962) of new vocabulary.

I am keen to explore this idea further, particularly the importance of tuning in to children's conceptual concerns. Atherton and Nutbrown suggest that 'professional

early years practitioners who pay careful attention to children's patterns of learning and their thinking concerns, through finely detailed observation, are able to develop their approach to working with children which is acutely attuned to their particular interests' (2013: 190). Introducing schema theory to students already forms part of our course programmes, however, although students often find it interesting, they regularly question its practical application – how exactly will this knowledge support their direct work with children and families? Hopefully these case studies highlight a link between schema theory - as a method of identifying children's conceptual concerns - and the role of practitioners, and parents, in offering appropriate and meaningful 'word-to-world mapping' (Hollich et al 2003) which, when matched to each child's interests, is more likely to be accommodated (Piaget 1962) into young children's ever-growing vocabulary bank.

I end with a quote from Atherton and Nutbrown, which encapsulates my experience of working in the early years centre in which I do, with some of the most passionate early years practitioners, committed parents and their beautiful children, and the hardest-working students that I have ever had the pleasure of learning alongside:

practitioners who are disposed to fall into step with young children and help them to move along in their learning need a level of sensitivity which may feel out of reach, but it is an obligation that should be accepted and embraced (2013: 148).

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