2013

Debunking Myths: Reading Development in Children with Down Syndrome

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Abstract: There is a considerable and growing body of research investigating reading development in children with Down syndrome. However, there appears to be a common gap between the research evidence and instructional practices. It has been argued that teachers have insufficient information to enable them to implement effective literacy instruction with children with Down syndrome. This has important implications for teacher education. The current paper draws on past and current research evidence to consider five common misunderstandings or 'myths' that exist in regards to reading development in children with Down syndrome regarding (1) receptive and expressive language, (2) phonological awareness and phonic decoding, (3) 'reading readiness' or (non)linear development, (4) optimal learning age and, (5) reading comprehension. A case example is presented and implications for teaching practice are explored

"*I want her to be a reader. Not just for bus timetables [or] stop signs, but a real reader, like to really love reading books for fun and to learn.*"

The mother of a 5-year-old girl who has Down syndrome shared this vision of her daughter as a reader at the commencement of a recent early intervention research study that I conducted. This mother, like so many family members, is eager to support her daughter in learning to read and wants to engage in early literacy experiences with her to support this. As a mother of a child with Down syndrome, she is also aware of the possible additional benefit of learning to read for her daughter's speech and language development (Buckley & Johnson-Glenberg, 2008; Laws, Buckley, Bird, MacDonald & Broadley, 1995). While in the past children with Down syndrome were mistakenly viewed as 'ineducable' (Cologon, 2012a; Smith, 2011), a considerable and growing body of evidence means that we now know that this mother's vision for her daughter is realistic (Cologon, 2012a; Buckley & Johnson-Glenberg, 2008; Kliewer, 2008) – as well as exciting in regards to the possibilities of reading for participation, learning and joy. Sadly though, there are many misunderstandings regarding reading development in children with Down syndrome and, consequently, opportunities to learn to read are often unnecessarily limited (Cologon, 2012a; Kliewer, 2008).

It has been argued that teachers have insufficient information to enable them to implement effective literacy instruction with children with Down syndrome (Al Otaiba & Hosp, 2004). As Johnston (2010, p.603) notes, "ensuring optimal instruction implies, first, focusing attention on teacher expertise". I have worked with many children with Down syndrome and their families and peers – both as a practitioner and as a researcher. I have also collaborated with many teachers and other preschool and school staff who are committed to supporting all of their students, including those with Down syndrome, in learning to read. Consistent with the comments of Al Otaiba and Hosp, (2004) many of these colleagues, along with many family members, have expressed concern about the lack of information and the frequently incorrect and sometimes conflicting information presented to them and the

difficulties that this poses for effective teaching. As a teacher educator, these concerns require urgent attention.

In recent research with 188 pre-service early childhood teachers in New South Wales, Australia, lack of knowledge, information and confidence were key concerns of the teachers in preparing to teach young children who experience disability (Cologon, 2012b; Cologon, in preparation).

> *"I am not confident in teaching children with disabilities at this point in time. Therefore a fear is that I will have a child with a disability in my class but won't be able to cope. I hope that I can learn more and become more confident in educating children with disabilities…I need clear research based information to support my ongoing learning."*
>
> *"I am worried that I don't know enough to work with a child or children with disabilities, I am afraid that I might do something wrong and harm that child…that I will limit their potential due to ignorance."*

The participants expressed a willingness and desire to support the education of all children, but a need for clear and accurate support and information emerged as a strong theme.

> *"I hope to gain a greater understanding in regards to working professionally with these children. I am concerned about not having enough or adequate information and knowledge when working with a child who has a disability."*
>
> *"Need information and training for myself and other early childhood teachers in prior to school and school settings to be aware and prepared to cater for all needs and keep children engaged, interested, challenged."*
>
> *"I need to learn appropriate ways that are still meaningful yet respectful and supportive of children with difference and disability…Knowledge and understanding how to cater for individual children's needs…provisions of resources, ideas, strategies to use with children with disabilities."*

A growing body of research provides evidence that teacher education can successfully support teachers in reflecting on their concerns and attitudes and developing greater confidence and more positive attitudes towards inclusive education (Cologon, 2012b; Sharma, 2012). Down syndrome remains the most common genetic cause of intellectual disability (Burgoyne et al., 2012) and birth rates of children with Down syndrome are continuing to rise (e.g., Collins, Muggli, Riley, Palma & Halliday, 2008; Shin et al., 2009). Consequently, providing information to teachers in supporting the education of children with Down syndrome is an important component of teacher education. Within the scope of one paper, it is not possible to address many aspects of learning and teaching. However, a focus on supporting children with Down syndrome in learning to read is one important aspect of addressing the concerns raised by pre-service teachers.

Research evidence related to five common misconceptions are examined in this paper in order to provide clear and comprehensive information to assist teachers in making informed choices about educational opportunities for assisting children with Down syndrome in learning to read. Kliewer's (2008) concept of literate citizenship in exploring reading in children with Down syndrome is considered. A case study of the implications of approaching teaching reading from a holistic perspective, (when discussing a holistic approach in this paper, I am referring to an approach from which reading is viewed as part of living life and engaging with each other [in the sense of a constructivist approach in which reading is seen as one aspect of literacy along with viewing, speaking, listening, writing and shaping – see van Kraayenoord, 2005, for example] and also, more specifically, an approach from which children are provided with reading instruction that addresses all aspects of the reading system), free of the impact of practices based on frequently perpetuated myths, is presented. This case study is used as an example of the implementation of the practices suggested in this paper. The case study involved following a child with Down syndrome to gather detailed documentation of the implementation of reading intervention within a mainstream classroom

over one school year, along with assessment of reading scores at four time points across 4.5 years. Macquarie University Human Research Ethics approval was obtained for conducting the case study and child and parent consent was provided. While it is not possible to generalise from one case study, a single case study approach is appropriate for exploratory illustration of the issues raised in a paper such as this (Yin, 2009).

Taken together, this paper provides much needed information for teachers and teacher educators to assist teachers in supporting children with Down syndrome to flourish. It is my hope that, by drawing together research on reading development in children with Down syndrome, this paper will provide a helpful resource for teacher educators as they seek to support teachers in developing knowledge and confidence in supporting the development of the diverse learners whose lives they will impact upon throughout their careers.

Before considering the research evidence, it is important to note that individual differences between people with Down syndrome are as widespread as within the population of people who do not have Down syndrome. A child labelled with 'Down syndrome' is likely to have more in common with a child who does not have Down syndrome who shares a common interest (such as both enjoying playing football), than they do with another child who happens to have Down syndrome. While children with Down syndrome are discussed as a group in this paper, this is not intended to reduce the importance of recognising the individuality of every unique child.

Reading Development, Participation and Inclusion

The value of learning to read cannot be underestimated. Reading is a key part of human communication and valued participation and inclusion in society. Engagement with texts facilitates development of deeper and wider understanding of the world in which we live (Schnorr, 2011).

Reading is a complex cognitive process in which a reader makes meaning of print (Jackson & Coltheart, 2001; Mirenda, 2003; Mol & Bus, 2011). Reading can also be a source of shared pleasure and an opportunity to engage our imaginations and shared communication (Buckley, 2001; Kliewer, 2008). A number of theories of reading development have been proposed and while there is not one universally accepted theory, there are numerous factors that are considered important to the process of reading including letter and word recognition, knowledge of letter-sound rules, the ability to decode unfamiliar words and reading for meaning or reading comprehension skills. These factors combine to form what can be referred to as the 'reading system'.

While there is still considerable disagreement about how these components of the reading system develop, the reading system itself can be explained through dual-route theory of skilled reading (Coltheart 2005). According to dual-route theory, reading is a complex process made up of, and dependent on, many different mental sub-skills which, together, form the reading system (Coltheart 2005). The proposed structure of the reading system, as described by Coltheart, is based on two ideas. Firstly, irregular words (e.g. *yacht*) cannot be read via letter-sound rules and need to be memorised and recalled as visual representations of a particular word. Secondly, regular unknown words cannot be recalled and therefore can only be read aloud through the application of letter-sound rules (phonic decoding). Given that skilled readers can read familiar and unfamiliar regular and irregular words, Coltheart proposes that skilled readers have the ability to recall memorised words *and* the ability to apply letter-sound rules to decode unknown words, abilities that readers need to develop in order to acquire a complete 'reading system'. Once the 'reading system' is acquired it forms a self-teaching mechanism (Evans & Shaw, 2008) through which a skilled reader can

continue to refine and expand their reading ability. However, the 'reading system' itself remains the same (Jackson & Coltheart, 2001). While the reading system is generally presented as a pathway from print to speech, speech is not the only mode of responding to print when reading. This noted, the approach presented in this paper is intended to address learning to facilitate both of the dual-routes to reading explained by dual-route theory. Any approach to reading instruction that does not address all aspects is likely to leave the child with an incomplete reading system.

Reading can be a source not only of participation, choice and opportunity, but also of personal and shared enjoyment and engagement through reading for pleasure. Consequently, there is an enduring public image that learning to read is critical to a child's success and happiness and is the 'bedrock' responsibility of schools (Kliewer & Landis, 1999, p.86). However, research provides evidence that many children who experience disability continue to be construed as incapable of literacy development and excluded from the rich literacy opportunities commonly provided to children who do not experience disability (Cologon & McNaught, 2013; Kliewer, 2008; Schnorr, 2011).

As Schnorr (2011, p.45) suggests, "we cannot predict how far any student with developmental disabilities may progress as a literacy learner. What is certain is that most students with these characteristics will not become literate if we do not teach them". Likewise it can be argued that if teachers are provided with inadequate or conflicting information regarding appropriate literacy instruction this is likely to impact negatively on the educational opportunities they are in a position to provide. Research also demonstrates that a lack of confidence on the part of teachers negatively impacts on attitudes towards inclusive education (Sharma, 2012). Supporting teachers through the provision of clear information drawn from the evidence base is clearly critical then, thus debunking common myths that may prevent the development of a complete reading system is an important goal.

There are a number of myths that may result in inappropriately low expectations and unnecessarily limited learning opportunities. In this paper I will address five of these myths concerning (1) receptive and expressive language, (2) phonological awareness and phonic decoding, and (3) 'reading readiness' or (non)linear development, (4) optimal learning age and, (5) reading comprehension.

Receptive and Expressive Language

Myth #1: What a child with Down syndrome can understand can be measured by what that child can say (or, in other words, the myth that limited speech equals limited ability)

A considerable body of research demonstrates that children with Down syndrome (amongst others) generally have much greater receptive than expressive language skills (Martin, Klusek, Estigarribia & Roberts, 2009), meaning that a child with Down syndrome is likely to understand far more than what s/he can say. This has implications for learning and participation, particularly in regards to processes such as reading, which are typically taught in a manner dependent on expressive language. It is important for teachers to seek to provide alternative modes of participation and responses and not to assume that spoken (oral) language is indicative of understanding – and for teachers to be supported in doing so.

Reading Before Talking

Reading and language development are closely intertwined for all children. For most children, oral language develops prior to learning to read and the relationship between language and reading only becomes reciprocal once reading development has commenced

(Cologon & McNaught, 2013; Kliewer, 2008). However, for many children with Down syndrome (amongst others – including some children labelled with Autism Spectrum Disorder), reading may form an alternative to oral language or form a pathway to oral language development, whereby children begin to read words first and then these words begin to appear in their expressive vocabulary – in a sense making reading a 'first language' (Cologon & McNaught, 2013; Buckley & Johnson-Glenberg, 2008; Kliewer, 2008; Laws et al., 1995).

It has been argued that silent reading may facilitate better comprehension than oral reading, due to the emphasis placed on pronunciation rather than meaning in oral reading (Halladay, 2012). For children who experience difficulty with expressive language over receptive language, including children with Down syndrome, this may be particularly relevant (Cologon, 2008). Consequently opportunities for silent reading activities may be a helpful approach and "instructional decisions based on oral reading alone should be made with caution" (Halladay, 2012, p.59). Additionally, in intervention research I have found that children with Down syndrome show significant improvements in phonological output (articulation of speech sounds) even when reading activities are completed silently (Cologon, 2008). This evidence supports the hypothesis that learning to read may have particular implications for speech development in children with Down syndrome, independent to the language rehearsal present in oral reading tasks. It is also helpful for practice in understanding that silent reading (not only oral reading) activities may be helpful for reading and speech development (see Table 1 for some examples).

Encourage non-verbal communication for the whole class	• Introduce the class to sign language and incorporate signs for key words in songs, routines, table activities and circle time. Offer students the option to respond to questions using signs. Over time the whole class will be able to choose this option to communicate with each other. • Encourage mime games where all of the children communicate without speaking – this can be a lot of fun and extends the communication skills of all.
Card Games	• 'Snap' with word cards or letters/letter-sounds • 'Memory' with word cards or letters/letter-sounds • 'Bingo' with word cards or letters/letter-sounds • Building sentences/words with word/letter cards • Matching sentences/words with word/letter cards
Words as visual prompts	• Give instructions in written and verbal form to support memory • Word choices: have a set of choice words and encouraging the child to choose from the choices and then verbalise the choice. • Develop written stories as visual prompts when the child wants to share what they have been doing at school with the family, or vice versa when the child wants to share 'news' at school • Use lists within games to provide non-verbal options – for example shopping lists or lists of items for cooking • Mystery activities: a game where students follow written instructions to complete a task – for example, in science making an exploding volcano!
Remember to always incorporate student interests and strengths, take an inclusive approach and make learning fun.	

Table 1: More than words – examples of engaging in literacy experiences in multiple ways

The dominant expectation is that a child will speak before s/he can learn to read. The discrepancy between this expectation and the reality for many children with Down syndrome needs to be considered in providing appropriate opportunities to learn to read.

Phonological Awareness and Phonic Decoding Skills

Myth #2: Children with Down syndrome cannot develop phonological awareness and phonic decoding skills

"That there is a relationship between performance on phonological awareness tasks and reading ability is undisputed" (Castles & Coltheart, 2004, p.79). While the precise nature of this relationship between phonological and phonemic awareness (PA) and reading development is a matter of continuing investigation (Castles & Coltheart, 2004; Duff & Hulme, 2012; Evans & Shaw, 2008), PA has been identified as the greatest single predictor of later reading success (Adams, 1990; Duff & Hulme, 2012). Influenced by the considerable evidence of the role of PA in reading development (e.g. Adams, 1990; Snow & Juel, 2005), the *National Inquiry into the Teaching of Literacy* in Australia (DEST, 2005), as well as other large evidence-based reviews in various countries including the USA (NICHHD, 2000) and the UK (Rose, 2006), have concluded that incorporating instruction focussed on supporting children to develop PA and phonic decoding skills – within an experiential and holistic approach to literacy – is essential for reading development. The development of phonic decoding skills is hypothesized to enable children to become independent readers as they develop the ability to self-teach new words (Share, 1999).

However, in contrast to recommended practices for teaching reading in general, a sight-word or functional approach to reading instruction is frequently recommended in research and practice for children with Down syndrome (Burgoyne et al., 2012; Cossu, Rossini & Marshall, 1993; Fidler, Most, & Guiberson, 2005). While this is at odds with broader understanding of reading instruction (Al Otaiba & Hosp, 2004; Cohen, Heller, Alberto & Fredrick, 2008), many children with Down syndrome have a relative strength in visual learning and in sight-word learning (Fidler et al., 2005). However, although a strength in visual and sight-word learning is a positive finding (and word recognition is one important element of the reading system as discussed earlier), there is a problem if we respond to this positive finding by limiting learning opportunities. A capacity for sight-word learning does not mean that a child cannot learn in many other ways as well. Sight-word learning on its own is insufficient for reading development and teaching with this approach alone is contrary to current evidence-based practices in literacy instruction in Australia and elsewhere, as noted above (DEST, 2005; NICHHD, 2000; Rose, 2006).

Sight-Word and Functional Reading

When a child learns words by sight, s/he learns to recognise and recall words as visual wholes. This approach relies on a rote learning process and does not include teaching a child to figure out how to read an unfamiliar word that s/he has not been explicitly taught (which is the purpose of phonic decoding). A child can get very good at reading the words that s/he has been taught, but unless the child generalises and 'cracks the code' or unlocks the alphabetic principle *without instruction*, this leaves the child only able to read the words that someone has chosen to teach her/him. This results in limited reading development (Cologon, 2012a).

A functional reading approach typically involves using sight-word instruction to teach a child a set of words that are considered 'functional' for everyday life (Kliewer, 2008;

Mirenda, 2003). For example, STOP, DANGER, TOILET, EXIT, MALE and FEMALE. Functional reading is important – as the name suggests, it is functional for everyday life – but it makes up only one small part of reading and as the major or sole focus of reading instruction it constitutes a severely limited approach with implications for only limited learning potential (Cologon, 2012a; Kliewer & Biklen, 2001; Mirenda, 2003). For example, when I was in my late teens I went travelling to Europe with my one of my sisters. Amongst the places we visited was Paris. We were very excited to be visiting Paris and made sure to brush up on our 'schoolgirl French' – in particular paying attention to speaking and reading functional words that we might need to get around and stay out of danger. This was very helpful to us as we made our way around the city. However, we could not pick up a book or a newspaper and read this for pleasure or for learning. If we were migrating to France, our learning approach would be very different as we would be seeking to become literate in the French language. Fundamentally, a functional reading approach is like relegating a child to the role of a tourist, rather than a literate member of the community (Cologon, 2012a). The danger of an over-emphasis on functional reading is that this approach comes at the expense of facilitating reading development for communication, education, participation and pleasure (Cologon, 2012a; Mirenda, 2003).

PA and Phonic Decoding Skills in Children with Down syndrome

In the 1990s, a group of researchers claimed that children with Down syndrome do not need to develop PA in order to learn to read (Cossu et al., 1993). This argument was based on the reading and PA scores of a group of Italian children. The claim was that the participants could read, but that they did not have any measurable level of PA. However, the evidence presented by these researchers actually demonstrated that all of these children *did* have measurable phonological awareness (Cologon, 2008; Cupples & Iacono, 2000), though arguably lower levels than might be typically expected compared to their word reading ability. In sum, the argument made by these researchers was actually found to be false.

Another argument against teaching PA and phonic decoding skills (as I have discussed elsewhere – Cologon, 2012a) is based on the idea that until children with Down syndrome develop sufficient auditory short-term memory spans, they are unable to develop phonic decoding skills (Fowler, Doherty & Boynton, 1995). It is common for people with Down syndrome to have limited auditory short-term memory spans (Jarrold & Baddeley, 2001; Laws, 2002), and phonic decoding does utilise auditory short-term memory (Cohen et al., 2008). However, research provides evidence that even children who do not have a measurable auditory short-term memory span (thus a span of less than 1) can develop PA and phonic decoding skills (Cologon, Cupples & Wyver, 2011; Cohen et al., 2008; Cupples & Iacono, 2002). Furthermore, research evidence shows that reading development can improve auditory short-term memory in children with Down syndrome (Laws et al., 1995). Therefore, providing reading instruction to individuals who have limited short-term memory spans can not only facilitate reading development, but may also provide additional benefits for short-term memory development.

Growing research evidence demonstrates that – when provided with the opportunity to learn – children with Down syndrome develop PA and phonic decoding skills (Burgoyne et al., 2012; Cologon et al., 2011; Cohen et al., 2008; Cupples & Iacono, 2002; Goetz et al., 2008; van Bysterveldt, Gillon, & Moran, 2006) and can demonstrate advanced reading development. In addition, research with children aged between 2 and 12 years shows that reading intervention targeting PA and phonic decoding skills results in improved articulation

of words (Cologon, 2008). These findings have important implications for teaching reading to children with Down syndrome (see Table 2).

Build on strengths	Link auditory and visual information*: It is important that reading instruction targeting phonological and phonemic awareness and phonic decoding skills pairs auditory and visual information to support learning.* Do not overload auditory short-term memory: *Linking auditory and visual information enables a child to use visual strengths to assist with reducing the risk of overloading auditory memory. Additionally it may be helpful to focus on syllables and word families to support development of phonological and phonemic awareness and phonic decoding skills.*
Scaffold comprehension	Link learning experiences to known concepts: *It is important to avoid isolated and meaningless activities as these will not support holistic literacy development. When focusing on phonological and phonemic awareness and phonic decoding skills* **link the words to meaning**. *Build knowledge of blends within words and use words within sentences.*
Support learning through interests and playful engagement	Engage playfully: *As well as engaging in a meaningful way, ensure learning experiences are fun and playful (avoid drills and build on interests to engage). Support phonological awareness development gradually through games. For example: clapping, jumping and hopping syllables (rather than just tapping); games drawing awareness to and identifying environmental sounds; and nonsense rhyming (in the vein of Dr Seuss).* Provide repetition in a fun and engaging way: *Building on interests and providing variety can make learning and repetition a positive experience. Remember learning to read is part of living life so it should be fun!*

Table 2: Important considerations for teaching phonological and phonemic awareness and phonic decoding skills

Failure to provide all children with holistic opportunities for learning to read – including activities intended to support the development of PA and phonic decoding skills, which enable children to progress beyond a basic level of reading ability towards independent reading ability – may place unnecessary, but serious, limitations on reading outcomes, potentially limiting children to an adult-determined 'functional' or sight-word vocabulary. On the other hand, providing learning opportunities that support the development of PA and phonic decoding skills can lead to very positive outcomes. Table 3 provides one example of seeking to support the learning of Ashley (pseudonym), a child with Down syndrome, across one school year within a grade 2 classroom. I will return to Ashley again later in the paper.

This case study is drawn from work with a teacher who was supporting the inclusion of Ashley in a grade 2 classroom. At this time Ashley had developed many important literacy skills including understanding that words and pictures carry meaning, developing phonological awareness and letter-sound knowledge, a growing sight-word vocabulary and developing enjoyment of storytelling. Ashley has a great sense of humour and was very involved in the class socially, expressed a great love of books, enjoyed word making and spelling games and required support to be included in writing activities. Ashley also enjoys and has a strong interest in sports and science. Up to this point, Ashley had received reading

instruction that was strongly focused on sight-word reading and had not been given access to instruction intended to support the development of phonological awareness and phonic decoding. Unsurprisingly therefore, assessment revealed Ashley had difficulty with phonic decoding compared to word identification. Passage comprehension was also identified as an area where further support was needed.

Every child and context is unique and the ideas presented here would need to be adapted to suit each individual situation. While I am often asked for a particular set and sequence of words to teach, teaching is best done through building on a child's strengths and interests. In supporting children's learning in inclusive settings, it is also essential to consider the curriculum content being addressed and connect the words chosen to work on with this. I am also sometimes asked how many times a word needs to be repeated with a child in order to be learnt. While in some reading research a specific number of trials are implemented with the same words in the same order, in reality children learn at an individual pace. Some children will develop reading skills rapidly and for others it will take a long time. It is also true that the same child will learn some skills or words or sounds more quickly than others.

The example shared here was implemented within a literacy-rich grade 2 classroom where children were encouraged to read and listen to a wide range of different styles of texts, create and tell stories and share information within small and large group activities and presentations. This was not a situation where everything was 'perfect' nor did everything always go to plan – instead it was a real life process of learning and teaching for all involved. Importantly, Ashley's teacher was open to new ideas and to learning to support Ashley through trial and error within a trusting relationship. Below are some examples of the process that Ashley's teacher engaged with to build forward in supporting Ashley with reading development – always seeking to connect with areas of interest and to engage Ashley inclusively with peers. As noted above this process needs to be individualised. However, it is my hope that this example will be helpful for assisting teachers in thinking through possibilities and getting started.

Phase 1: Starting With Onset and Rime

We continued book reading and supporting Ashley to continue progressing through the reading levels. Alongside this, building on Ashley's interests and strengths, we began working with simple word families (consonant, vowel, consonant [CVC] words such as dog, cat, pot, pan etc.) for words related to the current focus areas within the classroom. We took great care to make sure that we always kept a strong focus on reading for meaning throughout these activities to support Ashley's ongoing reading and listening comprehension.

Step 1

In Ashley's class at this time, the students were developing independent writing around shared topics and working together in small groups to research and develop information presentations. Many students had expressed an interest in animals during that time, sparked by the birth of puppies for a student's dog. Consequently, amongst other focus areas, we were engaging with stories about animals and learning many interesting animal facts. Ashley was developing storytelling skills, but still required considerable support for the fine motor process of writing and clear articulation during storytelling. However, we did not want to hold back his storytelling development or participation on account of this, so we used a

number of approaches to support Ashley's development in all of these areas, whilst also ensuring participation with the larger group. We also embedded an ongoing focus on PA and phonic decoding to provide daily repetition and engagement. We adapted some of the writing activities to incorporate word blending to complete sentences with a pre-written selection of words, sounds and blends. Ashley would also dictate (sometimes clarifying through sign) some sentences whilst engaging in experimental mark making. Ashley did this working in pairs where each of the children took a turn to tell a story and write it down. The children often shared ideas and worked together to develop their stories. The children then shared their stories with each other in a small group and chose one story to 'publish'. Each group worked together at the computer to type up the story and a printed copy of this story provided an additional prompt for writing practice (which we would share with families). All the children in the group then illustrated the story together. We explored different approaches to illustration in a wide range of books to support this process and the children enjoyed experimenting with different approaches to illustration.

We began with blending activities for CVC words. For this we presented words physically in two parts – the onset and the rime (*Rimes* are parts of words that look and sound the same, like <u>at</u> in bat, hat, sat. *Rhymes* are different to rimes in that they also sound the same but may look different, like wait/eight/gate). We modelled and then supported Ashley to develop independence in visually and verbally blending the words over time. For example, for the word 'cat' we would write <u>c</u> and <u>at</u> onto pieces of paper and we would say the onset /c/ and the rime /at/ (saying it as it sounds, not naming letters). We would encourage Ashley to physically and verbally blend "c" - "at" makes "cat".

Step 2

As well as careful consideration of how to incorporate additional learning opportunities to support the development of PA and phonic decoding skills, we had to consider carefully when Ashley was ready to build further. We did not want Ashley to get bored, but we also wanted to build in success and daily repetition. We noticed Ashley developing confidence, for example spontaneously leading a small group in their reading games.

As Ashley developed increasing confidence with onset/rime blending we began to add word segmentation to the daily literacy activities to further support the developmental of phonic decoding skills. For example, we would have the written word "cat", and talk about "what are the sounds in cat?" "cat is /c/ - /at/". As for blending, we always paired the auditory information with the visual information (written letters) – for example, writing the word, then cutting apart the onset and rime, or covering each part and then revealing the whole. This process worked well for incorporating into spelling games and provided a helpful scaffold for a number of students who are working towards accurate spelling with individual letters.
 Ashley's speech was also noticeably easier to understand when reading. The continued emphasis visually and verbally blending and segmenting the parts of words during phonics activities was helpful for working towards independent decoding. Playful engagement within meaningful activities, rather than drill, was essential for Ashley's learning, enjoyment and participation within the class and we were conscious of being mindful of this.

Phase 2: Expanded Words

Once Ashley was confident and comfortable with this process for CVC words we began adding more complex words, using the same scaffolds (e.g. night - /n/, /ight/). We also started

to work with multiple syllables for words that were longer and more difficult (for example: vol/can/ic e/rup/tion). Ashley was getting more confident with smaller words, but working with blending the parts or 'chunks' of a word for pre-written topic-focused words continued to assist with Ashley's reading. Drawing attention to all parts in a word was also helpful in assisting Ashley with speaking more clearly. As the class continued to develop further their skills in researching and presenting information across a range of curriculum areas, these strategies also assisted with Ashley's genuine participation in writing activities and small group work. The strategies for supporting reading development assisted with reading and constructing text, while the process of reading itself continued to support participation in group and individual sharing and presentations.

Phase 3: Individual Phonemes

As Ashley's confidence and independence with phonic decoding at the onset and rime level increased, we began to work with individual phoneme blending and segmentation. We started to encourage Ashley to blend the words one letter at a time for CVC words (for example, /m/, /a/, /n/ makes "man") and to segment with individual phonemes (for example, "you want to write 'man', okay, let's see if we can hear the words in man" then writing each one out saying together "man is /m/, /a/, /n/"). We kept working with syllable 'chunking' for more complex words. As Ashley developed confidence with individual phoneme blending for CVC words, we also introduced phoneme blends like /sh/ and /th/.

We continued to embed this within daily literacy activities, along with ongoing sharing with Ashley's family about all of what we were working on so that Ashley could continue this at home. The habit of working in small groups to produce a 'published' story was a useful strategy and as the class began to develop more complex PowerPoint presentations and mini videos, we were also able to easily share these with Ashley's family for follow up discussion and further reading and listening comprehension opportunities. We also shared with Ashley's family the books we were reading as a class (and noted some of the words we had been working with from these each day), as well as sending books home for individual reading.

As the year progressed, Ashley continued to develop confidence with blending and segmenting onset and rime, syllables and individual phonemes. We continued to support Ashley in finding the 'chunks' within words (segmenting), with an emphasis on looking for familiar patterns rather than getting stuck on individual letters.

Ashley's vocabulary for known words continued to develop, with many of the words we had been working on becoming words Ashley recognised on sight. Sometimes this happened very rapidly and sometimes after many repetitions of segmenting and blending. We also had conversations about words that do not sound 'right' when we try to break them up – like 'friend' and added these as words that Ashley was learning by sight. Ashley continues to develop his reading skills and takes great pride in sharing his learning as he genuinely participates with his peers.

Table 3: Scaffolding phonic decoding development

'Reading Readiness' or (Non)Linear Development

Myth #3: All children need to learn the skills for reading in a linear process wherein each skill is dependent on the previously learned skills

In the past, the concept of 'reading readiness' – in which it was theorised that children need to master a series of pre-reading skills before they can learn to read – ironically

prevented many young children from learning to read. In research with diverse groups of children, including children with Down syndrome, this concept of 'reading readiness' has been shown to be inappropriate and out-dated (Beukelman, Mirenda & Sturm, 2006; Kliewer, 2008).

Developmental theories of reading are frequently conceptualised as stage based development in which a child develops through a linear set of stages (e.g., Chall, 1983; Ellis & Large, 1988). These theories often result in the belief that a child cannot progress or move on to another aspect of learning until they master the pre-requisite steps or skills (Cologon, 2012a). However, uneven development is common in children with Down syndrome (Buckley, 2001). Waiting for a child to develop 'reading readiness' or master prerequisite skills before moving onto the next teaching step may prevent or inhibit reading development (Cologon, 2012a). (See the case study later in the paper for an example.)

In addition, as noted earlier in this paper, reading instruction (including experiences targeted at the development of PA and phonic decoding skills) should not be withheld from children with Down syndrome while waiting for the child to attain a minimum level of auditory short-term memory (Cologon, 2008; Laws et al., 1995).

Contrary to the myth, in reality, many children, including children with Down syndrome, have uneven development. Waiting for a child to achieve 'readiness' or master pre-requisite skills may prevent or at least limit reading development.

Optimal Learning Age

Myth #4: If a child does not learn to read in his/her early years then it is too late for reading development

In the past few decades, brain research (neuroscience) has demonstrated the impact of early experiences on brain development (Knudsen, Heckman, Cameron & Shonkoff, 2006; Shonkoff & Phillips, 2000; Shonkoff, 2012). Coupled with economic modelling demonstrating the gain-per-dollar-spent being greatest in the early childhood years (Heckman, 2006; Schweinhart et al., 2005), this had led to a surge in interest in research and practice in the early childhood years.

Early childhood experiences are very important for ongoing development and it is clearly imperative to support all children in having the best possible early childhood experiences. However, learning is an ongoing part of life – including literacy learning. Based on research with teenagers and adults who have Down syndrome (e.g. Fowler et al., 1995; Morgan, Moni & Jobling, 2004 & 2009), it can be concluded that as for language development (Abbeduto, Keller-Bell, Richmond & Murphy, 2006), the notion of a 'plateau' or point at which reading development ceases is another myth or 'glass ceiling'. If a child does not learn to read when they are young they can still learn to read as an adolescent or an adult (Fowler et al., 1995; Morgan et al., 2004 & 2009). Many children need ongoing support for reading development throughout childhood and beyond – and it is never too late to learn. Ongoing instruction beyond the early years utilising age-appropriate materials that draw on a child's interests are essential (Schnorr, 2011).

Nonetheless, case study research has provided evidence to demonstrate that some children with Down syndrome may be able to develop reading ability at a very early age (Buckley & Johnson-Glenberg, 2008; Cologon et al., 2011) and that early reading development can have a significant benefit for ongoing language development (Buckley & Johnson-Glenberg, 2008; Groen, Laws, Nation & Bishop, 2006). Given the particular benefits that learning to read may have for spoken language development in children with Down syndrome, the opportunity to learn to read at an earlier age than expected for the general population may be developmentally important. Additionally, it has been shown that

early literacy instruction leads to higher levels of later reading achievement in children with Down syndrome (Bochner, Outhred & Pieterse, 2001). In short, for a person who has not yet learnt to read (whatever his/her age), the time to get started on supporting reading development is now.

Reading Comprehension

Myth #5: Children with Down syndrome cannot understand what they are reading

In the past it was incorrectly suggested that children with Down syndrome do not comprehend what they read and instead recall words by rote as meaningless memorised sequences of letters (Buckley, 1985). In reality, research provides clear evidence that children with Down syndrome can and do comprehend what they read (Buckley & Johnson-Glenberg, 2008; Cologon et al., 2011; Groen et al., 2006). Reading comprehension is an area, however, where children with Down syndrome may need particular support for learning. One issue for reading comprehension lies with the extent to which methods of measuring comprehension rely on expressive oral language. It is essential to carefully consider whether the approach used for measuring reading comprehension is actually measuring reading comprehension or whether it is in fact measuring expressive language.

Engaging in a wide range of meaningful, personally relevant, fun, and contextualised literacy experiences has been found to be important for all children in learning to read (Cologon, 2012a; Katims, 1996; Mol & Bus, 2011). Children with Down syndrome often need ongoing support for developing listening and reading comprehension (Roch & Levorato, 2009). Research points to the need to support children in continuing their reading development alongside meaningful and broad engagement with the world in order to foster listening comprehension (Roch & Levorato, 2009). Supporting reading comprehension development requires carefully reflecting on the activities we engage students in, to make sure that we are in fact teaching and not testing (see Table 4).

Tips for supporting reading comprehension
Teaching not just testing!
Teach concepts AND reading
Engage through meaningful experiences
Build on the known to consider the unknown
Always make links to meaning
Teach question words (who, what, when, where, how and why)
Do not overload auditory short-term memory (use visual supports)
Teach and model reading comprehension strategies
Build in multiple methods of expressing comprehension

Table 4: Strategies for supporting reading comprehension

Morgan et al. (2009) found that working with adult readers to understand question words (who, what, when, where, how and why) assisted with reading comprehension. Morgan et al. (2009, p.181) used a set of 'tell about' words to assist developing readers with interpreting these words. For example: 'who' requires telling about people, 'where' means telling about places, 'when' refers to time (see Table 5).

Questions to work through in preparing instruction to support reading comprehension
What does the word mean?
Does this word mean more than one thing?
What do we already know about this word and what can we find out?

What does it look like?
What does it do/what can we do with it?
How can we experience this concept or use this object?
How many different ways can we associate this word to the meaning?

Table 5: Questions to consider in preparing instruction to support reading comprehension

Building on research by Palinscar and Brown (cited in van den Bos, Nakken, Nicolay & van Houten, 2007), van den Bos et al. investigated effective methods for increasing reading comprehension in adults with intellectual disabilities. Teaching strategies for predicting, clarifying and summarising passages was found to enhance reading comprehension (see Table 6).

Predicting
Connecting with experience and current knowledge
Looking for clues
Checking predictions during and after reading
Clarifying
Model questions for clarification and encourage practice of using questions for clarification
Clarification of words, sounds/chunks or concepts
Linking back together and re-reading after clarification
Summarising
Identifying the key points (sentence, paragraph, passage)
Methods for identifying key points
Practice for sharing summary
(van den Bos et al., 2007)

Table 6: Teaching reading comprehension strategies

Considering the Possibilities: A Case Study

As discussed, there are considerable negative implications if the myths regarding reading development in children with Down syndrome are perpetuated. Taking the focus on reading comprehension, a lack of PA and phonic decoding instruction limits capacity for a child to develop the ability to read unknown words, this reduces the possibility of passage comprehension. Measurement of reading comprehension generally relies on expressive communication, which is not a true reflection of understanding. On the basis of assumptions regarding linear development children are often held back with reading until they meet a required assessment level on a reading comprehension measure.

One example of some of the impacts of these myths was reported in a study exploring the use of Augmentative and Alternative Communication strategies with children with Down syndrome. Hooten and Westaway (2009) reported a situation where a decision was made that a child needed to repeat all books at a particular reading level due to perceived difficulty with reading comprehension. The child was very unhappy about this and had begun engaging in disruptive behaviour during reading lessons despite reading being his area of greatest strength academically. By taking the time to investigate the child's views, the problem in the situation was uncovered and different reading materials were introduced (rather than continuing to repeat the same readers).

Returning to the case study of Ashley (detailed in Table 3), Figure 1 provides scores from a reading assessment of Ashley at 8 years of age. I assessed Ashley's reading using the

Word Identification, Word Attack (phonic decoding) and Passage Comprehension subscales of the Woodcock Reading Mastery Test-Revised (WRMT-R) (Woodcock, 1987). This reading assessment measures reading age compared with standardised age norms for the 'typical' population. I also measured Ashley's letter-sound knowledge using a measure of letter-sound recognition. A measure of letter-sound recognition, rather than letter-sound production, was used in order to accommodate for Ashley's developing speech and language skills (Cologon et al., 2011). Ashley scored 25/26 on letter-sound recognition at 8 years of age.
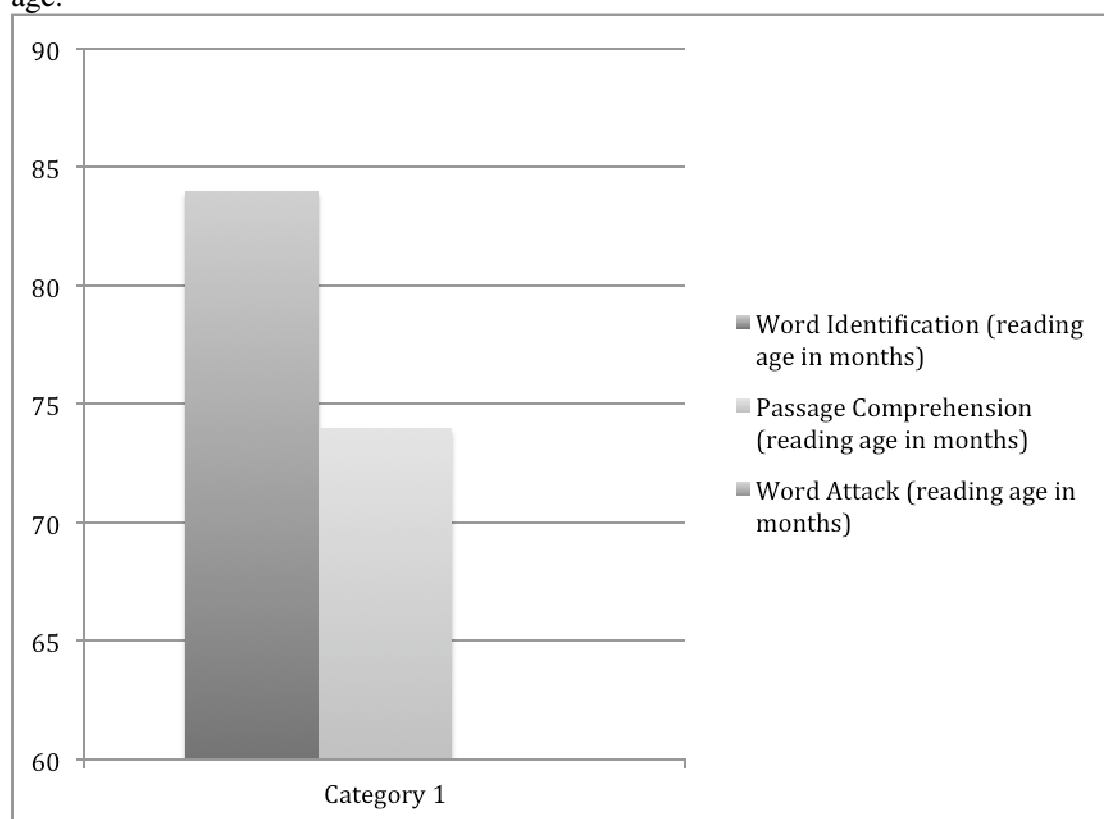

Figure 1: Ashley's reading age (in months) for word reading, passage comprehension and word decoding at 8 years of age

As shown in Figure 1, Ashley's reading age for word reading was much higher than for reading comprehension and Ashley was not yet able to score on phonic decoding. Based on this, a common educational decision would be to keep Ashley at the current reading level (like for the child in Hooten & Westaway's 2009 study) until reading comprehension 'catches up' with word identification ability. This decision would be based on the assumption that reading development is a linear process, building on the notion of 'readiness' or prerequisite skills, as discussed above. This decision may be de-motivating and cause considerable frustration for Ashley (like for the child in Hooten & Westaway, 2009). The assumption is also likely to be that Ashley is not able to develop phonic decoding skills and therefore to only focus on sight-word instruction (on account of the common myths as discussed above). However, in Ashley's case the decision was made that Ashley would continue to the next reading level, with ongoing support for reading development, including reading and listening comprehension and phonic decoding (as detailed in Table 3 earlier in this paper). Ashley was supported through a holistic approach to reading development in which reading activities were provided everyday embedded in all aspects of Ashley's education, including integrated units encouraging reading development within maths and science activities, for example. Activities were provided that enabled Ashley to engage with and demonstrate developing

reading ability without relying solely on spoken language. This included reading games and scaffolded shared reading activities. All reading activities were explicitly connected to meaning and frequently associated with Ashley's particular interests and strengths. Ashley was provided with appropriate choices for books to read that could extend his learning whilst providing reading success and enjoyment. Activities targeting phonological awareness and phonic decoding were introduced and scaffolding was provided to break down tasks into smaller steps when required. When Ashley struggled with a particular aspect of reading development, modelling, repetition through interests and games and ongoing personalised stories were provided, but the assumption was made that Ashley would continue to develop phonological awareness and phonic decoding. Therefore, rather than stopping and 'getting stuck' Ashley continued to progress to more difficult aspects of PA. Many different approaches to assessment of Ashley's learning were implemented including collection of samples, observations, re-telling activities and activities that did not depend on oral reading, such as following written instructions (e.g. following written instructions to make an exploding model volcano). However, for the purposes of this research an independent assessment of reading incorporating a repetition of the standardised reading measures (WRMT-R) was conducted at 8 years as noted above in Figure 1, then repeated at the end of the school year, another year later and again a further 2.5 years later (see Figure 2). The example of activities described above in Table 3 occurred between the first two assessment points.

      As shown in Figure 2, as the opportunities provided to Ashley for engaging with and learning to read continued, including continuing to move up the levels of readers, the gap between word identification and reading comprehension ability closed. Ashley's reading development was not held back despite the considerable gap between word reading and reading comprehension scores at 8 years. After 4.5 years Ashley's reading ability had advanced even further and gap remained closed.

      Additionally, Ashley demonstrated considerable improvements in phonic decoding ability as measured in the Word Attack subtest. Ashley scored at ceiling level (26/26) on letter-sound recognition in the first of these follow-up assessments, consequently the test was not repeated in the following assessments. Now having access to relevant learning opportunities, Ashley demonstrated the ability to develop phonic decoding skills alongside word reading and passage comprehension. Ashley's ability to decode words levelled with word identification and 4.5 years later phonic decoding was still steadily growing.
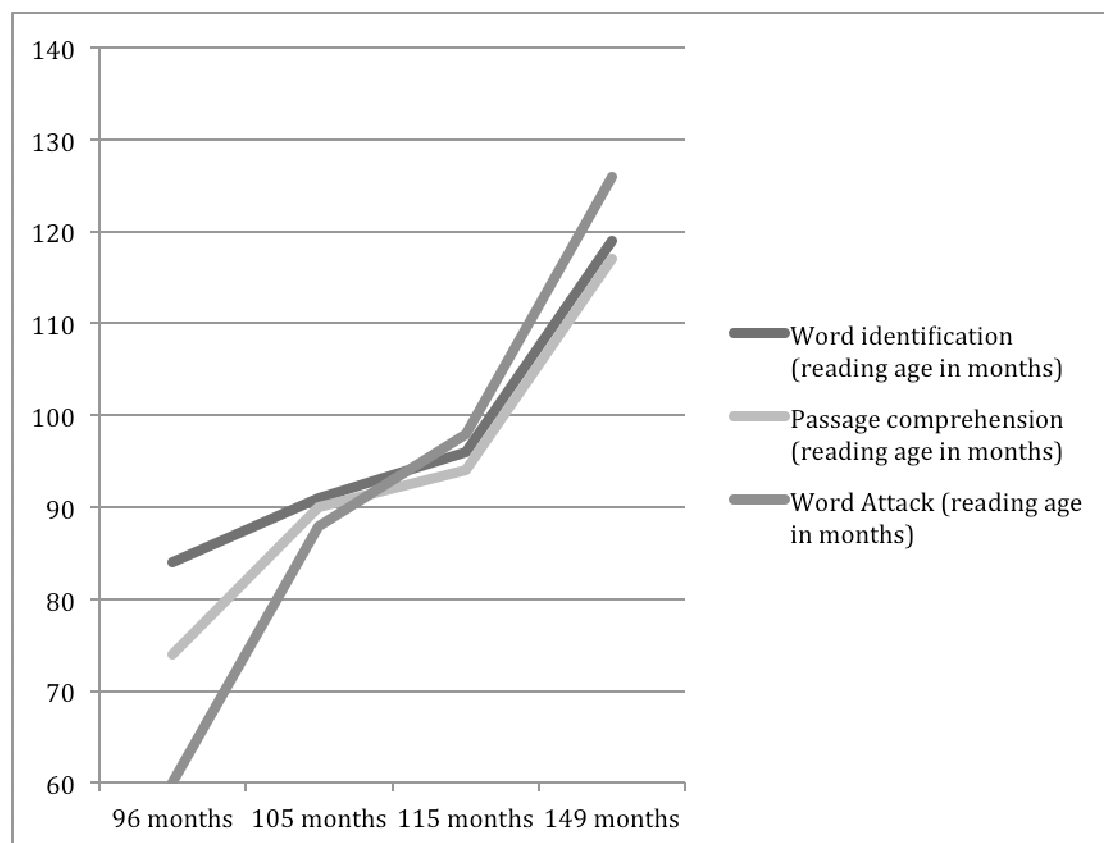
Figure 2. Ashley's reading development over 4.5 years

This is only one case study and therefore cannot be generalised. As a single case study this also shows only change over time for one child, which may be influenced by many factors. However, drawing together this case study with the case study reported by Hooten and Westaway (2009), there are implications for practice. Clearly it is important to consider decisions regarding teaching practice carefully and reflect on the potential implications (intended and unintended). While the use of reading levels in classroom practice is common, teachers need to be 'knowledgeable and thoughtful' in using this approach, including in regards to methods and analysis of assessment (Halladay, 2012, p.53). Additionally, while strength in sight-word reading is a positive finding of many studies, this should not be interpreted to result in a focus on sight-word reading instruction at the expense of reading instruction aimed at supporting the development of PA and phonic decoding. Emphasis needs to be placed on all areas of the reading system, whilst making reading experiences meaningful and on facilitating effective communication in order to genuinely advance reading ability in all areas.

Conclusion

The opportunity to learn to read involves experiences aimed at supporting the development of understanding and knowledge about the world (and associated vocabulary), exposure to print (including story-book reading), development of PA, letter-sound knowledge and understanding of the alphabetic principle (Snow & Juel, 2005). These elements are important in supporting children to learn to read – including children with Down syndrome. In order to develop fluent and advanced reading skills, it is important for children to be exposed to a wide range of books during childhood. Additionally, providing support to

enhance the development of reading comprehension is important. This requires placing emphasis on meaningful experiences and linking reading to everyday experiences and interests. As argued by Lesley and Labbo (2003), a holistic approach to literacy learning is important for all children – including those identified as having 'special educational needs'. This requires building on the interests and strengths of the child and engaging with quality children's literature, environmental print, experimental literacy and all forms of exchange of human communication through the rich experience of literacy learning. In order to facilitate the realisation of these opportunities, the issues discussed in this paper need to be addressed through teacher education (pre-service education and in-service professional development). Given that the majority of children who have Down syndrome in Australia (and in many other nations) attend mainstream schools, it is essential that this information be provided to all teachers – not only teachers studying 'special' education.

People with Down syndrome commonly have a relative strength in reading, but realising this strength requires learning opportunities and appropriate expectations. People with Down syndrome can develop advanced early reading abilities, but can also learn to read later in life. People with Down syndrome can develop PA and phonic decoding skills. People with Down syndrome are capable of understanding what they read. People with Down syndrome can be exceptional readers and can engage in reading alongside their peers in inclusive educational settings. However, the continuing discrepancy between what is possible and what occurs for many needs to be addressed. Biklen writes that "the good teacher always sees his or her task as that of finding a better strategy, where the teacher is a coach rather than a judge, someone who looks for and fosters dialogue, and where demonstrated ability evolves through a reflective process rather than a contested one" (2000, p.345). It is my hope that this paper will provide support to teachers as they engage in this ongoing process.

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Acknowledgements