A Right Brain Approach to Reading Intervention

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A RIGHT BRAIN READING INTERVENTION

Abstract

The purpose of this study was to use a right hemisphere reading intervention method with three struggling primary readers. Neuroimaging research was used to help understand what is happening in the brains of non-readers. The research suggests that this method will work for students, as there is an asynchrony in the processing time between the visual and auditory components in the left hemisphere for dyslexic individuals (Breznitz, 2008). This method bypasses that system and utilizes the right brain to learn to read.

This method was first developed by Broun and Oelwein (2007) for students with specific disabilities and the author wondered if this right hemisphere based method would also be good for non-readers. All three struggling readers made progress with this method, some of them reading for the first time ever. I developed an instructor’s manual, which is included in this thesis.
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A RIGHT BRAIN READING INTERVENTION

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Chapter One: Purpose of This Study

I have worked as a teacher over the course of 25 years, with some time taken off to have 3 children, and have seen many beginning readers blossom and grow into their reading abilities. I have also seen children who didn’t make progress, despite desperately wanting to and their disappointment in that. My undergraduate degree from SFU was in Early Childhood Education, Learning Disabilities and Psychology. Most of my teaching experience has been as a teacher for the early primary grades, Kindergarten to Grade 2, and as a Learning Support Teacher for elementary students. I utilized systematic reading programs such as Riggs (McCulloch, 2003) or Jolly Phonics (Lloyd, 1992) in my classroom. I worked side by side with Kindergarten teachers to help improve the phonemic awareness of their students, implemented early intervention to help them at the start of their education and used ‘best practice’ techniques, yet there were students that didn’t make the expected progress despite all of our efforts. What was happening for these students? They were able to converse about topics that interested them, could manage themselves socially and were creative. However, they were unable to obtain easily the skill of reading.

Many of the students could tell you the sound of the letter and even produce them in succession, but were unable to read the words. You could hear them stutter and sputter as they tried to read the words fluently. They could read all the correct letter sounds and then produce a completely different word when they read it smoothly seconds later.

My course of action for these students was typical of the learning support model used in our district and province – we broke down the components of reading into small chunks with more attention to the sounds, often isolating them in non-contextual ways to reinforce the letter sound. We worked on rhyming, breaking words into syllables, matching pictures with letter sounds, reading Dolch word lists and reading simple levelled text. Essentially we taught them in a louder, slower, more exaggerated way, as one might try when they are hoping to communicate with someone speaking a different language.
While minimal progress was made sometimes, it was not able to lead to independent fluent reading, nor was it effective or efficient progress. I was unable to find something that worked better for this population of learners.

I was fortunate to attend a workshop given by Patricia Oelwein in January 2011 where she presented a reading method she first designed for use with students with Down’s syndrome and then extended to students with Autism. This approach was unique in that it taught the word in its entirety, without breaking it down into sound components, in a systematic manner. She had us participate as learners using non English words, and I could see immediately the difference in this approach. I was intrigued. I wondered how this approach would work with students who weren’t on the Autism spectrum, specifically some students whom I had been supporting since Kindergarten yet were still not reading at an instructional grade level.

I was able to implement Broun & Oelwein’s (2007) method in the Learning Assistance Room to seven Grade One & Two students for approximately 4 weeks in the Spring of 2011. It was the successful response to this method by some of the students that interested me. One student declared “Oh, how easy this is now! I wish the rest of the day was as easy as this is”. He was able to read words that were of interest to him and then transfer that skill to reading books that interested him, rather than the simple meaningless text with which he had been working. Other students were able to read sentences fluently for the first time ever. They were all growing their personal bank of words they could read as they increased their reading competency and fluency.

At the end of that school year I left my position as a Learning Support Teacher and returned to the classroom, teaching Grade Two-Three students. One of my students was not yet reading at grade level; he was at the end of Kindergarten/beginning Grade One reading level. I asked his mom if I could work with him after school with this different reading method. She said yes, so our sessions began in October 2011.
I also was enrolled at VIU in the Masters’ Educational Leadership program for the 2011-2012 year, where we were to identify a problem that might be our focus for our thesis. I had it – this different reading method that I has used briefly as a Learning Support Teacher and was again using after school with one of my students. I formulated these questions to guide my research;

- Is there a reading intervention that is better suited for chronic non-readers?
- Could a program designed for students with special needs be used successfully with struggling readers?
- What does research tell us about the effectiveness of intervention for chronic non-readers?
- What does neuroimaging research tell us about how non-readers process written language?
Chapter Two: Definition of Terms

This chapter will explain briefly some of the terms used in my paper.

**Bottom up reading methods.** A bottom up reading method starts with the smallest sounds and then builds upwards with different reading skills. Teaching reading starts with the smallest measures of language such as letter sounds, rhymes, phonics, phonemic awareness, segmentation, blending and sounding out and sequentially builds up reading skill from there (Helland Tjus, Hovden, Ofte, & Heimann, 2011). This approach is used most widely to teach reading, which starts with the smallest components then moves on to larger pieces such as digraphs, syllables, onsets, rimes, words and word families, then on to more complex words, then onto fluency and comprehension. Some reading programs that are left hemisphere focused include Jolly Phonics, (Lloyd, 1992) Read Well ®, (Cambium Learning Group), Riggs, (McCulloch, 2003) Reading Recovery, (Clay, 1993), Orton Gillingham Method (Gillingham & Stillman, 1960) and Lindamood-Bell LiPs® computer program (Burke, Howard & Evangelou, 2005)  The bottom up reading method relates to left hemisphere processing, which is explained in this chapter.

**Chronic Non-Reader/Dyslexia.** – These terms are used to describe readers who have average intelligence but can’t read fluently despite intensive intervention and classroom instruction (Krafnick, Flowers, Napoliello and Eden, 2011). Reading difficulties are a universal condition, regardless of language
Dyslexia is a specific learning disability that is neurobiological in origin. It is characterized by difficulties with accurate and/or fluent word recognition and by poor spelling and decoding abilities. These difficulties typically result from a deficit in the phonological component of language that is often unexpected in relation to other cognitive abilities (Lyon et al., 2003, p.2).

The term dyslexia is used to explain people of average intelligence who have trouble with reading and often remain significantly behind their peers (MacDonald, 2009). Many researchers have shown that dyslexic individuals have IQs that fall well within or above the average range (Frijters, Lovett, Steinbach, Wolf, Rose, Seveik, & Morris, 2011; Krafnick et al., 2011; Lyon et al., 2003). While the term dyslexia has slipped out of popular use in North American schools, it is still a recognized label for people who have extreme difficulty with written language and is often used in international research papers. The terms chronic non-reader and dyslexia are used interchangeably in this paper.

**Hemisphere dominance** – Originally the specialized functions of the brain hemispheres were shown mostly by brain damaged individuals (e.g. Broca’s area, Wernicke’s area) but recently functional neuroimaging has also determined many other areas of specific strengths using neuro-typical individuals (Donaldson, 2004; MacNeilage, 2009; Tian, Wang, Yan & He, 2011; Toga & Thompson, 2003). The hemispheres share functions, but some are more localized than others (Herve, Zago, Petit, Mazoyer & Tzourio-Mazoyer, 2013). This specialization has also been found in animals and is thought to have an evolutionary advantage (MacNeilage, 2009). Hugdahl & Westerhausen (2010) conclude that
regardless of the record or analysis measures of hemispheric asymmetry, the two cerebral hemispheres show different patterns of activation when provoked by specific stimuli or tasks.

Different hemispheres showed different specializations... the right hemisphere (RH) is organized more efficiently, with greater regional interconnectivity than the left hemisphere (LH). In turn, the LH counts more crucial hub regions. (these) differences reflect RH specialization for broader processes, such as visual spatial integration tasks, and the leading role of the LH for highly demanding specific processes, such as language and motor actions (Herve et al., 2013, p. 71).

**Left hemisphere processing.** — Language production, grammar, and syntax primarily occur in the left hemisphere, along with complex motor programming and speech (Toga & Thompson, 2003). Selective attention occurs predominately in the left hemisphere (MacNeilage, 2009). Temporal, sequential and analytical functions are left-hemispheric strengths (Silverman, 2002). Auditory-sequential learners are good listeners, learn sequentially, are rapid processors, and think in words (Silverman, 2000). They tend to be orderly, well-organized, and follow the sequence of events necessary for high academic performance (Silverman, 2000).

**Neuroimaging information.** The neuroimaging information comes from fMRI (functional Magnetic Resonance Imaging), MSI (magnetic source imaging), EEG (electroencephalography), and OT (Optical Topography also known as Functional Near-Infrared Spectroscopy or fNIRS) technology used to measure levels of brain activity (Goswami, 2010; Ortiz, 2011). fMRI uses changes in blood flow in the brain, as measured by the protons of water molecules in brain cells, to show localisation of function (Goswami, 2008). EEG is useful for measuring the extremely low voltage changes caused by the electro-chemical activity of the brain cells that give precise information about neural timing (Goswami, 2008). EEG can track the timing of cognitive activity, as it shows the neural system’s response to sensory stimulation, which is measured in milliseconds (Breznitz, 2002). The OT system is non-invasive technology, involving a helmet type brain-
scanning system, which measures changes in the relative concentration of hemoglobin in the cerebral cortex of the brain (Ortiz, 2011). Near-infrared light is sent to the brain and absorbed by hemoglobin, with changes indicating activation in specific brain regions (Ortiz, 2011). Donaldson (2004) points out that functional neuroimaging information has given us the ‘what’ and ‘how’ of the brain functions, not just the ‘where’ (p.442)

**Right hemisphere** – The right hemisphere processes the emotional, rhythmic, intonation and melodic aspects of language, as well as humour and metaphors. (Toga & Thompson, 2003). The right hemisphere processes language at a deeper, more semantic meaning than the left hemisphere. The processing of visual and auditory stimuli, spatial manipulation, facial perception, and artistic ability are represented bilaterally, but may show right hemisphere superiority (Beaumont, 2008). The right hemisphere reads faces and emotional expression with more accuracy than the left hemisphere (MacNeilage, 2009). The right hemisphere takes in the whole picture, attending and analyzing the spatial relations, as it attends to the global aspects of the environment (MacNeilage, 2009). Right-hemispheric strengths are thought to be spatial, holistic, artistic and abstract (Silverman, 2002). Learning comes through imagery of the whole concept, and visualization is used to organize, construct, assimilate and process ideas – the thinking is done in pictures (Silverman, 2002). The right hemisphere learns holistically and needs more time to process information (Silverman, 2000). Spatial tasks, such as geometry, map reading, geography, mazes, chess, construction activities, knowledge of mechanics, and three-dimensional puzzles are right hemisphere strengths (Silverman, 2000).

**Top down reading methods.** This method focuses on comprehension, making connections, vocabulary and big picture thinking (Helland et al., 2011). Reading models that have a top down approach to reading instruction include Key Vocabulary (Ashton-Warner, 1986), Whole Language (Goodman, 1982), Sight Word Reading (used in the basal reader series like Dick and Jane), Broun and Oelwein Literacy Approach (2007), Language Experience (Brugelmann, 1986) and computer programs
such as CAT(Carry A Tune)(Biggs et al., 2008). The top down reading method relates to right hemisphere processing, described in this chapter.
Chapter Three: Research about reading

Importance of reading

Every educator would tell you that learning to read is one of the foremost purposes of the early schooling years. Freire (1983) eloquently describes the importance of reading as a way of using language to know about our world, to create a relationship between reader and the text. The United Nations Educational, Scientific and Cultural Organization states that reading proficiency is one of the critical foundations of education (Siah & Kwok, 2010). Most elementary schools put reading as their number one goal in their growth plan. Targeted money for resources and in-service is dedicated to improving the reading ability of students by increasing teacher competency in this area. There is an abundance of literature about how to teach reading, and many different publishers and programs aimed at having every child reading.

Understandably, there is considerable effort put into ensuring that all students can read and write, comprehend and respond to literature. There is immense pressure to have students read fluently and with comprehension as they leave the primary years (Helmelt, 2011). It is recognized that reading failure negatively affects students’ self esteem, motivation, school performance and even life choices (National Institute for Literacy, 2003; Siah & Kwok, 2010).

The ability to read has been identified as a crucial component for both the education system and society (Spector, 2011). Cartledge, Yurik, Singh, Keyes & Kourea (2011) stated that “reading plays a pivotal role in and out of school and has a cumulative long-term impact on an individual’s success. The snowball effect of reading deficits leads to a series of negative social and academic outcomes including special education risk” (p. 131). Trehearne (2000) followed 54 children from first through fourth grade and found that there was a 88% probability that a child who is a poor reader at the end of Grade One will remain a poor reader in Grade Four. Pressley (2006) reported that between 24% and 39% of students have scored in the "below basic" category for over the past 30 years.
It is generally agreed upon that there are three components to being a reader - phonemic awareness, comprehension and fluency (Browder, Wakeman, Spooner, Ahlgrim-Delzell, & Algozzine, 2006). Reading methods usually use a top down approach, a bottom up approach or a combination of both to teach these components (Verhoeven, Reitsman, & Siegel, 2010).

Top down processing starts at the top, breaking sentences or utterances down into images, then words, morphemes, and phonemes, with an emphasis on meaning and strategy instruction. Bottom up processing starts with the smallest pieces of words – sounds- and then builds phonemes into letters, blends, words and words into the highest syntax level (Helland et al., 2006, p 106).

**Early Intervention**

In response to the vitally important skill of reading, research points to the value of an early intervention model to help ensure all students will be successful. Cartledge et al. (2011) provide ample evidence of the need for early intervention; “there is the urgency to provide explicit, systematic core reading instruction and early supplemental secondary intervention” (p 142). It is believed that if children receive instruction early, then reading difficulties or learning disabilities can be avoided (Cartledge et al., 2011; Dion, Brodeur, Gosselin, Campeau & Fuchs, 2010). There are multiple levels of support, often referred to as a tiered system, with the most intensive intervention given to those that are judged to be most behind (Glover, 2010). Numerous studies speak of the benefits of intervention efforts for many students (Cartledge et al., 2011; Dion et al., 2010; Fuchs & Fuchs, 2006; Glover, 2010; Gustafson, Falth, Tjus, and Heimann, 2011; Harvey, 2011; Hemelt, 2011; Kim, Capotosto, Harty, & Fitzgerald, 2011; McKenna & Human Resources and Skills Development Canada, 2010; Morgan, Fuchs, Compton, Cordray, & Fuchs, 2008; Morrow, 2011; Pullen, Tuckwiller, Ashworth, Lovelace, & Cash, 2011; Ransford-Kaldon, Flynt, Ross, & Society for Research on Educational Effectiveness, 2011; Ross & Begeny, 2011; Stahl & McKenna, 2006).
Most early reading intervention focuses on phonemic awareness, knowing how to blend sounds into words and reading symbols as sounds (Gustafson et al., 2011). Elbro (1996) explains that since most reading deficits are known to be in phonological awareness, that is where intervention studies have focused. Extensive research into reading difficulties has produced many reports that speak of the effectiveness of a left hemisphere reading intervention method (Cartledge et al., 2011; Dion et al., 2010; Glover, 2010). A left hemisphere reading intervention method, also considered a bottom up method, teaches from sound bites to single letters to words and then to sentences. This approach is used most widely to teach reading, which incorporates rhymes, phonemic awareness, segmentation, phonics and blending, then moves on to larger pieces such as digraphs, syllables, onsets, rimes, words and word families, then on to more complex words, comprehension and fluency. Some reading programs that are left hemisphere focused include Jolly Phonics, (Lloyd, 1992) Read Well ®, (Cambium Learning Group, 2004), Riggs, (McCulloch, 2003) Reading Recovery, (Clay, 1993), Orton Gillingham Method (Gillingham & Stillman, 1960) and Lindamood-Bell LiPs® computer program (Burke, Howard & Evangelou, 2005). Pullen et al. (2011) wrote that “direct and explicit instruction in the alphabetic principle, phonemic awareness, phonics and fluency are critical components for a solid literacy foundation” (p.145). Most beginning reading methods are built on the assumption that the smaller components of reading, phonemic awareness, are the critical building blocks for reading and that one must have those subskills first before they gain any of the other two components, comprehension and fluency (Molfese, Key, Kelly, Cunningham, Terrell, Ferguson, Molfese, & Bonebright, 2006). Most early reading intervention focuses on phonemic awareness, knowing how to blend sounds into words and reading symbols as sounds (Gustafson et al., 2011).

Most interventions are targeted at remediating the type of processing that happens in the left hemisphere, which involves sound letter symbol integration for phonological output, rule based orthographic processing and single word reading (Krafnick et al., 2011). Recent research has shown that
the dyslexic individual’s brain isn’t wired to effectively process written language in the left hemisphere (Breznitz, 2002, 2008; Cao et al., 2008; Spironelli et al., 2010). Would methods that target right brain hemisphere learning styles be more successful at remediating a subset of non-readers?

**Lack of progress**

Evidence that early intervention is beneficial for many students is not disputed, yet there continues to be a population of learners, who, despite the same opportunities of intervention, classroom instruction and extra support, do not become fluent readers (Cartledge et al. 2011; Katzir, 2008; Kim et al., 2011; Waznuk & Vaugh, 2007). Helland et al. (2011) gave evidence that while training phoneme awareness and letter sound knowledge facilitates emergent literacy, there continues to be a population that doesn’t make adequate progress despite this proven method. While lots of research validates the success of early identification and intervention, there remains a subset of students who don’t make adequate progress and continue to fall behind their peers (Cartledge et al., 2011; Dion et al., 2010; Fuchs & Fuchs, 2006). Katzir (2008) reported that between 10-20% of children have serious difficulties learning to read. Gustafson et al. (2011) state that “some children did benefit from a phonological intervention while other children seemed resistant to the same intervention” (p 124).

Despite the research that supports phonemic knowledge as the necessary beginning teaching point, it is evident that not all students learn with the bottom up reading methods that are so commonly used (Cartledge et al., 2011; Gustafson et al., 2011). Closer examination of the data from bottom up intervention models for struggling readers makes it clear that non-readers never attain the reading level of their peers and often “remain at ‘intensive’ or high risk status”, with 86% of them still needing intensive intervention (Cartlege et al., 2011, p. 154). While early instruction in phonological/phonemic processing is valuable, many children still are not able to become successful readers (Gustafson et al., 2011). It is recognized that not all students will read in the meeting or exceeding level, often with 25% of children in the not yet or minimally meeting level (Lewis, 2007). Shaul and Breznitz (2007) state that
10-15% of students will not be successful readers. Helland et al. (2011) have concluded, after a review of recent research, that children with literacy impairment rarely catch up with their peers.

Morris, Bloodgood and Perney (2003) showed that 85% of the time letter sound knowledge was a successful predictor of whether a child would be reading at grade level by the end of Grade One. Ross and Begney (2011) and Cartledge et al. (2011) reported that by the fourth grade, approximately one third of US students have not acquired even basic literacy skills. These findings are supported by Sanger, Ritzman, Schaefer and Belau (2010) and Harvey (2011) both reporting that 74% of struggling readers in Grade Three will still be struggling in high school. Kim et al. (2011) reported that 70% of eighth graders have scores consistently below reading proficiency levels. In 2003, nearly 9 million adult Canadians were at a low level of literacy proficiency (Grenier, Jones, Strucker, Murray, Gervais & Brink, 2008).

Cartledge et al. (2011) reported that only 35% of students identified with learning difficulties were performing at or above basic levels. Gustafson et al. (2011) found that while some children are easily remediated, other children are difficult to remediate, as they seem resistant to the phonological intervention that was successful with their peers. What is interfering with their ability to learn despite countless hours of early, intensive, explicit and systematic approaches to learning to read?

This trend of perennial chronic reading difficulties has persisted, despite advances in early identification, different levels of support and an increase in knowledge about how the brain learns to read. Waznuk and Vaugh (2007) state that we are still not knowledgeable about those students who have a very low response to effective interventions. Cartledge et al. (2011) stated that chronic non-readers don’t make sufficient growth to close the reading gap and apparently need more intensive and extensive intervention than they are currently receiving. Biggs et al. (2008) were clear that for chronic non-readers, different approaches must be tried to help them become literate, as the current ones are not working for them.
Simos, Fletcher, Berggman, Breier, Foorman, Castillo, Davis, Fitzgerald and Papanicolaou (2002) stated that the progression for a reading disabled individual to be a fluent reader is very slow, even with intensive remediation. Frijters et al. (2011) found in their intervention research that although the struggling readers made some improvements within the six reading assessments, the “good readers consistently made three to four times the gains” (p. 157). Gustafson et al. (2011) showed that the typical readers in their study consistently did better than the reading difficulties group, often outperforming them by 50% on some measures.

Teaching should be designed to provide explicit instruction, with repeated practice and structured attention good methodology, whether it is a top down or bottom up approach (Frijters et al., 2011; Helland et al., 2011). Although there are comparatively few studies of early intervention based on top down methods, recent research has been supportive of this method. Berends and Reitsma (2006) did a study showing that reading based on word meaning was more successful than a method that focused on the sounds within the words, with the strongest effects seen in Grade Two students.

**Reading Difficulty defined**

Different terminology has been used to describe this group that doesn’t make progress, such as learning disabled, dyslexic, persistently poor reader, struggling or non-reader.

Lyon et al. (2003) have updated their 1994 definition of dyslexia to include the neurological component. The term dyslexia is used to explain people of average intelligence who have trouble with reading and often remain significantly behind their peers (MacDonald, 2009). Many researchers have shown that dyslexic individuals have IQs that fall well within or above the average range (Frijters et al., 2011; Krafnick et al., 2011; Lyon et al., 2003). While the term dyslexia has slipped out of popular use in North American schools, it is still a recognized label for people who have extreme difficulty with written language and often is used in international research papers. The label used to describe this population isn’t as important as the recognition that there is a need for a different method needed for them to become readers (McKenna, 2010).
Universal problem

The difficulty of learning to read is a universal condition which spans various cultures and languages. Katzir (2008) and Katzir et al (2004) cited a multitude of studies that demonstrated how problems with learning to read are universal and not limited to specific languages. They (Katzir, 2008; Katzir et al, 2004) state that deficits in reading rate and naming speed are consistently found across languages that represent different orthographies. “No orthography appears immune to reading disorders. It is well documented that developmental reading disabilities are a problem with global dimensions” (Katzir et al, 2004).
Functional Neuroimaging to Understand Reading Process

Recent advances in neuroimaging, specifically functional neuroimaging, have allowed a clearer understanding of what is and isn’t happening in the brains of people as they interact with text (Breznitz, 2002, 2005, 2008; Froyen, Willems, & Blomert, 2011; Goswami, 2008; Ortiz, 2011). Breznitz (2005, 2008), Goswami (2008) and Krafnick et al. (2011) have used neuroimaging to show that struggling readers and dyslexic individuals process printed information differently than skilled readers. While this has been suspected on the basis of observable behaviours for over one hundred thirty years (MacDonald, 2009), with brain imaging we are now able to see those differences in detail. Advances in medical imaging technology now provide us with concrete information of what is occurring inside the brain during reading using fMRI, EEG or OT data (Goswami, 2010; Ortiz, 2011). This new knowledge of how the brain learns to read, along with what is happening in the brain of those who struggle, can help lead us to develop new techniques to make non-readers successful at a task that has previously eluded them.

As you look at the words on this page, this stimulus is first processed by the primary visual cortex. Then, pre-lexical processing occurs at the left occipito-temporal junction. The dual route theory posits that processing then follows one of two complementary pathways. The assembled pathway involves an intermediate step of grapho-phonological conversion – converting letters/words into sounds – which occurs in certain left temporal and frontal areas, including Broca’s area. The addressed pathway consists of a direct transfer of information from pre-lexical processing to meaning (semantic access) (OECD, 2007, p. 89).

Goswami (2008) reports that there are differences in the brain activity between readers and non-readers. Helland et al. (2011) cite numerous studies in which fMRI have revealed reduced or no activation in left temporo-parietal cortices in children and adults with a reading disability. In dyslexic
individuals, the under-activation of the left angular gyrus has been associated with difficulties mapping visual input onto suitable phonological representations (Shaywitz & Shaywitz, 2005). Rather than the ‘typical’ left hemisphere route, the dyslexic brain processes written information in the right hemisphere (Breznitz 2002, 2008; Cao et al., 2008; Spironelli et al., 2010). Dyslexics do not use their left hemisphere in an effective manner to process written language.

Neuroimaging has shown that typical readers predominately use four areas in the left hemisphere, while individuals with dyslexia typically show underactivation in those areas (Helland et al., 2011; Ledoux & Gordon, 2011; Lyon et al., 2003; Katzir, 2008; Krafnik et al., 2011). Neuroimaging has demonstrated that while reading poor and dyslexic readers have increased activation in their right hemisphere (Breznitz, 2002; Ca et al., 2008; Froyen, et al., 2011; Goswami, 2008; Katzir, 2008; Krafnick et al., 2011; Ledoux & Gordon, 2011;).

Goswami (2010) writes that recent neuroimaging information suggests that the core neural systems used in learning to read are the same in every language. “Even for languages like Chinese, which would appear reliant on visual processing, it is oral language skills that underpin the acquisition of reading” (Goswami, 2008, p. 138). Evolutionarily, we were not designed to be readers (Goswami, 2008).

The human brain has existed for approximately 60,000 years while the alphabetic code has been in use for only 5000 years. It can therefore be argued that the ability to read is not part of our evolutionary heritage, as no brain system was specifically developed for the purposes of reading. The reading process is a highly composite cognitive task, which relies on brain systems that were originally devoted to other functions. (Breznitz, 2008, p.1).

Advances in technology have given proof that it is not a lack of intelligence, motivation (at least in the beginning), opportunities or other disabilities that cause the reading difficulties (Frijters et al., 2011; Krafnick
et al., 2011; Lyon et al., 2003). The ability to hear phonological differences is intact with dyslexic adults (Froyen et al., 2011), yet they have difficulty with the written phonemes. Despite years of remediation, reading difficulties still exist for adults, regardless of reading level, education or profession (Meyler & Breznitz, 2005). Froyen et al. (2011) state that “results from fMRI studies reveal that second grade dyslexics showed the exact same anomalous letter–speech sound association deficit in the same brain areas as adult dyslexic readers who received at least 10 more years of reading education” (p 646).

So what is happening in the brain of dyslexic individuals that makes them unable to benefit from years of intensive intervention? Dyslexics have a deficit in phonological and orthographic processing which transfers into word recognition problems, slow reading rate and ultimately comprehension difficulties (Breznitz & Berman, 2003). Goswami (2008) reports that there are differences in the brain activity between readers and non-readers.

The children with developmental dyslexia showed under-activation in the core left temporoparietal networks, with older dyslexics showing over-activation in right inferior frontal gyri. The children with developmental dyslexia also showed increased activation in right temporoparietal networks. (Goswami, 2008, p 141) Goswami (2008) has reported that regardless of language, dyslexic individuals’ reading difficulties all have “specific problems in detecting and manipulating component sounds in words” (p. 137).

**Asynchrony Phenomenom**

Breznitz (2005) has used neuroimaging technology to show with precision that a time delay interference exists between seeing the word and processing the sound, which is causing the difficulty in reading. “The reaction times of the dyslexic readers during word decoding were about 121 ms longer than for the regular readers” (Shaul & Breznitz, 2008, p. 24). Meyler and Breznitz (2005) stated that the asynchrony between processing the auditory-phonological stimuli and processing the visual-orthographic stimuli means that the two systems can’t effectively communicate with each other.
Research indicates that non-linguistic auditory information arrives in the auditory cortex after 30 ms, whereas visual information arrives in the visual cortex after 70 ms (Breznitz, 2008). In other words, based on the natural operation of these biological entities, auditory stimuli leave the ‘entryway’ and arrive in the brain faster than visual stimuli. While in the natural world light travels faster than sound, in the brain, the visual information has farther to travel than the auditory information and is therefore processed after the sound stimuli. The information concerning the phonemes that make up a word arrives sequentially while the word processing in the visual channel is a holistic and simultaneous process (Breznitz, 2008).

The Asynchrony Phenomenon suggests that in an attempt to process information adequately, the system’s speed attribute becomes a crucial factor in the further development of activation in the pathways. Moreover, more than one system is activated in each pathway and as such, synchronization is required and can only be achieved if the time gap between systems is minimal (Breznitz, 2008). Among dyslexics, at the perceptual level, information arrived about 11-12 ms later from the posterior to anterior brain areas. Among regular readers, this delay was limited to 3-4ms. The reaction times of the dyslexic readers during word decoding were about 121 ms longer than for the regular readers (Breznitz, 2008).

The asynchrony phenomenon stems from a lack of speed coordination in the modalities and brain systems…cross-modal integration processing in the dyslexic readers appeared to require a wider time gap between the information arriving from the visual and the auditory modalities (Breznitz, 2005, p 211 & p 212).

This misfiring in the phonological and visual components of reading continued for non-readers who did not make clinically significant gains even with intensive phonological intervention and continued to use their right hemisphere regions for decoding and phonological tasks (Frijters et al., 2011).
Froyen et al. (2011) speak of the need for further research to explore how this audiovisual integration impacts non-readers. Researchers such as Breznitz (2008) and Goswami (2008) have looked at how we can use this knowledge from neurological imaging to help design new methods for remediation.

Intervention in Kindergarten, Grade One and Grade Two that matches reading hemisphere dominance could mean a whole different schooling experience for many students. A top down, right hemisphere intervention approach to teaching reading to chronic non-readers is essential if we want to ensure that young student are literate and functional. Therefore, the current study aims to explore the impact of a right brained reading intervention for chronic non-readers.
Chapter Five: Reading Intervention Technique

I contend that there is a subset of the non-reading population that can be better served by a right brain intervention approach to reading. A structured right brain intervention approach that would bypass the errant left hemisphere processing and systematically teach new words to be mastered in a whole, visual and connected manner would be best for some of our non-readers.

The Broun and Oelwein Literacy method (2007) is a right hemisphere approach that starts with images and connections and teaches the word as a whole, rather than a sequence of letters and sounds. This reading methodology is similar to the theory behind “Drawing On The Right Side Of The Brain”, which essentially circumvents the left side of the brain so that the right brain can draw what it sees, without interference from the left hemisphere’s verbal and analytic analysis of what it sees (Edwards, 1999). Golon (2005) wrote that for right hemisphere dominant students, the phonetic approach that is most commonly used is counter-intuitive to how they think and learn. Golan (2005) states that right hemisphere learners think in images, in big picture fashion and need to read that way too.

My project’s design was an intervention study with single subjects, using the Broun and Oelwein (2007) literacy method. Participants were two primary students and one intermediate student in an elementary school in the Comox Valley, who had demonstrated minimal progress in reading despite numerous intervention opportunities.

A Teacher’s Manual is included in this paper Appendix A. The method will be described briefly here but for a more complete description and templates, refer to the Teacher’s Manual.

This method involved students generating 4-8 words per session that were meaningful to them. Flashcards and a 4x4 grid were made up out of those words. Three stages to learn those words were match, select and read, with each stage done three times in each lesson.

The three stages of reading acquisition are:
1. Matching – visually discriminate same and different
   • Read each word to the student on the flash card, one at a time.
   • Give the card to the student and ask them to match it to the word on the grid.
2. Selecting – selects flash card when the word is spoken. Indicates recognition of the word

- Place the four flash card words on table in random order
- Ask the student to hand you a specific word
- If the student has difficulty, point to the word on the grid and ask them to find it again
- Once student has successfully read the word, they match the word up with the one on the grid

- Do this for all four words
- Do this three times in total

3. Reading – student reads the word

- Show student the flash card and ask them to read the word
- They match the word up with the grid words

The words were then used to build sentences to be read with fluency, as fluency is required for comprehension (Biggs et al., 2008). Helper words, often sight words, were written on flashcards to complete the sentences and to teach those words in context. I generated a variety of sentences to read, using known words, for the student to read. The student also had the opportunity to build a sentence using their words.

These sentences were then typed into a word document and printed out for the student to read at other sessions. These sentences were also used for copying out and drawing a picture that matched it.
Chapter Six: Action, Results and Reflections

Action

Using this method, I worked with three students (designated as B, A and E), one from Nov. 2011-Feb. 2012, one from Oct. 2012-April 2013 and one from Jan. 2013-April 2013. These students all attended a rural school in the Comox Valley School District. We worked in a one on one setting, after school, two or three days a week, as time and situations permitted.

With all of these students, I talked to their parents first to offer the opportunity to try this new reading program. I explained to the parents and students about the theory behind how this reading intervention works, using a simple diagram of the two different methods used to teach reading (appendix B.) I also explained I had seen evidence of the students’ amazing ability to learn in a variety of ways. As different things occurred in our sessions, we would talk about how using the right brain visual processing method to learn to read was working for them.

Two of the students’ parents had also experienced extreme difficulty in learning to read and with school in general, with one student’s parents not completing schooling past Grade Eight. All of the parents were talented in other areas, ones that are associated with right hemisphere strengths. They were good at designing, sewing, mechanics, cooking, and a variety of art media.

Working with B

- B. worked for 12 sessions from Nov 2011-Feb. 2012, coming Monday, Wednesday and Friday after school for 30-40 minute sessions, as time and situations permitted.
- B. was in Grade Two. He was reading at PM Benchmarks 6, which is an instructional beginning Grade One level. B. was not able to read fluently, had a difficult time sounding out words and made mistakes on each page as he read. The text he could read was heavily supported by pictures, repeating patterns and predictable text. He was a reluctant reader, in that he didn’t interact with books in any manner during silent reading time. When B. was offered the
opportunity to use the computer to listen and view stories, he was only mildly interested at the beginning. B.'s interest in viewing books this way was short lived.

- B. was able to learn almost 8-10 words every session, as he was quick to learn the words. He would do two 2x2 grids of words, producing 8 visual words. He would often have them learned before we got to the final stage of reading. He was able to read the sentences with fluency most times.

- B. was able to read the helper words when they were in context – in the sentence – better than when they were isolated.

- B. often had something in his hands as he was learning the new words; Lego, building blocks, cars, etc. He seemed able to keep his hands busy and still focus on the words.

- B. learned 94 words in 12 sessions (Throw, Chevy, stick, dog, with, play, outside, like, I, as, is, to, for, me, Bike, ride, fast, friends, skinny, tires, pinky, lift, Brother, play, pick, lets, game, old, him, PS2, Fun, birthday, Lego, gift, remote, control, car, wall, Laser, section, cup, yellow, People, shoot, win, other, player, two, on-line, try, X-box 360, Camera, watch, apps, iPhone, pictures, take, Cars 2, YouTube, Pen, hot, dark, light, glow, sleep, draw, Cole, tent, house, over, Cheering, awesome, watch, score, Canucks, Vancouver, lose, hockey, T.V. player, Nature, sky, cool, orange, looks, fire, morning, trees, Nice, special, toys, are)

- B. was very proud of the words that he was learning and the amount of fluency he could have while reading the sentences.

- B. could read sentences that were entered into a template on the computer and then printed out

<table>
<thead>
<tr>
<th>My friend Cole had a sleep over at my house.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cole and I sleep in my tent.</td>
</tr>
<tr>
<td>My tent is a glow in the dark tent.</td>
</tr>
<tr>
<td>I draw on the wall of the tent with the pen. The pen has a glow in the dark light.</td>
</tr>
</tbody>
</table>
A RIGHT BRAIN READING INTERVENTION

It is hot in the tent.

- B. was often happy to stay after class and work on his reading. He took the bus home, so we had it arranged for his mom to come pick him up at 3:00 after our sessions. He was always happy to show her what he had done that session.
- B.'s mom said that this program helped B. in a huge way to be able to read words and sentences. They were happy with his progress, as was I.

Working with A.

- A. had 27 sessions from Oct. 17 2012- Apr. 17 2013, coming Monday, Wednesday or Friday after school for 35-50 minute sessions, with breaks in between after 20 minutes or so. A. liked to set a timer for our work sessions and she would also set them for her break times. The use of the timer was A.'s idea.
- A. was in Grade Two. She was not yet able to write her name independently, she couldn’t recognize the numbers past 4 (yet she could count orally up to 20 and could match items with one to one correspondence up to 10), she didn’t know any of the letter names and she was not able to read any words. She didn’t know the letters in her name yet.
- The LA teacher reported that A. was the lowest of all of her remedial students.
- A. had received LA in her Grade One year. Her grade one class and LA teacher used Jolly Phonics to teach the letter sounds, reading and writing.
- A. was very articulate, interested in animals, empathetic to others, imaginative and kind. Her ability to understand what to do to look like a student was on par with the other students. A. tried hard in activities that she was able to do independently.
- A. was able to explain her thinking with details. Her comprehension of material covered was good. She was able to make inferences, predictions, make connections, retell and synthesize a story or lesson. A. had good oral abilities and she was able to tell stories with interesting and
important information included. I or another adult would scribe A.s responses for language, science and socials assignments. Her thinking was always at the ‘meeting expectations’ level.

- A. would learn 4 visual words per topic. At the start of our tutoring sessions in October, she often required more sessions in the matching and selecting stages to feel confident about moving on. We did as many sessions in each stage as needed.
- Sometimes A. wouldn’t learn any new words during a session, as we would reread the words she had learned previously to help her become more fluent in them. This was done by following the same 3 stages and building sentences as the sessions before.
- At the beginning of our session, in October, A. needed to be instructed about where to put her eyes when she was reading, how to point to each word in the sentence being read and how to use visual imagery to help her learn the words.
- A. would sometimes need to be cued about the category or topic that the word was from for her to read it.
- A. was starting to sound out some of the words, as this is the technique her LA teacher uses. I didn’t stop her from doing this, just as I wouldn’t stop a child who had been instructed to know the letter sounds from reading a word fluently. A. was often slow and choppy on her sounding out ability and sometimes needed to be shown the action that accompanied a letter to recreate it’s sound.
- A. demonstrated an improvement in knowing her letter sounds, yet when she tried to transfer the sounds sequentially to read a word, sometimes she was able to do it correctly and other times she wasn’t. When A. read it incorrectly, she often didn’t produce a word similar in sound or structure to the misread word, but would instead produce a word that was close in context or meaning (e.g. sand – “sss…aaa…nnn…ddd” – “beach”).
• A. learned 82 words in 27 sessions (Spiders, decorate, ghosts, house, my with is, and, I, Dog, play, energetic, frisbee, have, a, Hamster, fuzzy, cute, run, Cats, pets, birds, cage, we, Lizard, colors, change, puff up, Horsey, party, birthday, shooting, Trampoline, bumbdrop, bounce, high, Althea, on, the, my, to, Hawaii, box, castle, umbrella, sand, in, has, are, Bunka, boat, work, lives, Gramma, fish, sleep, goes, with, Mrs. Hedican, gray, hair, hug, Bella, puppy, lovey, fluffy, love, squirted, water, Can, yes, no, Joseph, boy, girl, chase, bull, ride, buggy)

• A. is not fluent with all of these words yet; she still needs practice with them regularly to be able to read them fluently.

• A. had improved in her ability to learn the words quicker as the year progressed. In April, she would ask for more than 4 words to learn and often wouldn’t need all of the sessions within the stages. She was quicker at learning the words during the matching and selecting stages.

• A. said that she was getting much quicker at reading words and her brain was more relaxed now.

• A. was beginning to read these words in other contexts. She was beginning to read A,B,C levelled books during silent reading time and identify when she saw a word she knew.

• A. loved literature, stories and illustrations, often absorbed in looking at books during our silent reading time. A. also wanted to have stories read to her. As our sessions continued, I started requiring that before I read to A., she had to read three ‘just right’ books to herself and then one of them to me. I remember the first time she read a book that had a word in it that she knew from our sessions. “Hey, I can read that word! That says ‘pet’. I know that because it is one of my words.”

• During one of our silent reading times, A. was reading a book and came upon a word that she didn’t know. She tried to sound it out, but was unsuccessful. I told her that it was one of her words about dogs; she was then able to fluently read play.
• A.’s family would wait with her at the sessions. Sometimes they would join us at the table and other times they would sit on the couch in the classroom to wait.

• A. enjoyed the sessions, looking forward to the end of the day when we worked together.

• A. was making progress in being a reader and tried hard at her sessions, although she required breaks, redirection and encouragement when she was getting tired.

**Working with E.**

• E. had 15 sessions from Jan 17-April 16 2013, coming Tuesday and Thursday after school for about 20-30 minute sessions, as he had to attend another activity that afternoon.

• E. was in Grade Four. He was a non-reader who was very aware of his difficulty in his reading and writing ability and was uncomfortable with his lack of progress. He had a psycho-educational assessment in his grade two year.

• E. was disengaged from reading.

• E. agreed to help me with my research; this program was offered not to ‘tutor’ him, as his family felt that he would not be open to this, but he would be willing to help me out. E. was a willing participant in each session.

• E. was interested in nature, dinosaurs, earth elements and Minecraft. He was very well versed in the things in which he was interested.

• E. often used words that were complex and not phonetically easy to read.

• E. was interested in the small plastic animals in the play area of our room, and would often bring them over during our sessions.

• E. needed to move during our sessions and I didn’t require him to sit down. He would often practice his martial arts moves or kneel, spin or twist about as we were talking and as I was preparing the flashcard words, grid or sentences. When it was time for E. to attend to the words, he would stand or sit at the table for the needed time, without my asking him.
• E. learned 78 words in 15 sessions (Ancient, reptile, dinosaur, ferocious, a, is, Play, super, Mario-bros, video, games, Minecraft, build, I, on, Big, mean, eat, bull, fish, shark, like, Powerful, nature, study, combined, power, air, water, fire, elements, earth, create, the, is, when, Outside, fun, brother, climb, Trees, ride, bike, tag, trick, yard, my, our, Donut, chocolate, cream, Boston, top, Rocks, crystals, cave, ruby, interesting, in, find, Rain, snow, laval, lightening, mixture, background, tornado, has, Medical, scan, x-ray, blood, hospital, heart, b.p.m., rate)

• E. would sometimes require time to think of a word when we came back to them during another session. He would say “wait….wait…. I know that one.” He wouldn’t want me to give him any hints about it, as he usually was able to read it correctly. He always felt so good about being able to read the words fluently.

• E. enjoyed making and reading sentences. He was good at reading them fluently. He was able to read the helper words in context easier than when they were presented in isolation.

• At our second session, E. said that “this reading is way way way easier than the other way, cuz I use my pictures”.

• E. was proud of his progress and shared his work with his gramma or father when they picked him up.

• E. was beginning to transfer some of his reading ability to his school day. One day the class was out of the room and he wondered where they had gone. Then he looked at the board, and said “Hey, I can read that. It says that they are at music!” He was excited to know that he could read something, as he considered himself a non-reader.

• E. shared that it was much easier to read the sentences that we worked on, as the words came easier to him.

• E. was beginning to try reading simple A, B & C levelled books with his gramma, by his own initiation.
• E. said that his brain “was like a computer – loading up with new knowledge” using this reading method. This method was “adding more fibers to the cable” in his computer to be able to read.

• E. said he thinks completely in pictures.

• E. was a great guy who wanted to share his knowledge about his various interests and I was always amazed at how much he knew about certain things, especially the natural elements of earth.

Reflections

This method certainly worked for these three students, yet in varying degrees. It was due to a number of different factors. The students differed in their beginning reading level, with B. having the strongest reading skill base. B. was able to learn more words each session than A. or E. The students differed in their ability to focus on the lesson, with A. requiring instruction about where to put her eyes when she was reading. A. required more sessions at each stage to learn the words and she still was not fluent in all of them at the end. E. and B. both liked to have something in their hands to build, examine or play with as they were learning. E. was the most active during our sessions; he is very good at flip kicks!

I didn’t expect this method to instantly make them into readers – I recognized that it would take them time to learn a bank of words, develop stronger reading habits and have confidence in their abilities. I watched my own progress in drawing while in the “Drawing on the Right Side of the Brain” classes and knew that I still required direct instruction to be able to do many of the activities. I also held the belief that if I continued attending those drawing classes I would become more and more independent, confident and skilled in my drawing ability. I think that is the same for B., A., and E.; they were successful with this method, yet still required time, practice, confidence and guidance to become more independent, confident and skilled in their reading ability.
During our sessions, I often talked to the three students about how the two hemispheres of their brain work together, how if they use the four senses (see it, say it, read it, write it) while they are learning it will be retained easier. We would often discuss their word choices, allowing them to communicate all that they knew about it. We also talked about how to use visual imaging to help them read the words.

All three students were proud of their progress and they were able to transfer some of the words and/or learning to other reading activities. It was exciting to see them begin to see the possibility that they will be readers one day!
Chapter Seven: Conclusion

I started my research with these four questions in mind:

- Is there a reading intervention that is better suited for chronic non-readers?
- Could a program designed for students with special needs be used successfully with struggling readers?
- What does research tell us about the effectiveness of intervention for chronic non-readers?
- What does neuroimaging research tell us about how non-readers process written language?

My research led me to some very interesting papers and new information. I was happy to find research about chronic non-readers that supported my observations as a learning support and classroom teacher. The functional neuroimaging information was fascinating, as it provided an explanation of what was occurring inside the brain for both chronic non-readers and readers. The most exciting piece was that the neuroimaging research can help guide future practice in how we help struggling readers.

1. *Is there a reading intervention that is better suited for chronic non-readers?* Yes, there are some reading interventions that might be better suited for students who have failed to make progress, despite intervention and solid classroom instruction. This reading intervention uses a top down, right hemisphere approach in a systematic manner and it might be better suited for some chronic non-readers. Researchers Berends and Reitsma (2006), Biggs et al., (2008), Broun and Oelwein (2007) and Helland et al., (2011) spoke of the success with a top down method. The CAT (Carry A Tune) reading intervention showed good results for middle school students (Biggs et al., 2008). The CAT program uses systematic and repeated practice in learning to read using karaoke songs (Biggs et al., 2008). Breznitz (1987, 1997, 2003) and Breznitz and Berman (2003) demonstrated how struggling readers’ fluency is increased if they read at a quicker rate, essentially by-passing the sounding out function of the left hemisphere so that the right hemisphere can process it wholly.
2. Could a program designed for students with special needs be used successfully with struggling readers? Yes, Broun and Oelwein’s (2007) *Literacy skill development for students with special learning needs: A strength-based approach* provided a good design structure that was helpful for struggling readers. In a personal conversation with Ms. Oelwein, while asking for her permission to use her technique, she stated that she too has seen those students who can sound out but not fluently sequence the sounds to read the words. She was interested in how non special needs student would respond to their technique. I think that Broun and Oelwein’s program is a good fit for many struggling readers. It has a good systematic approach to teaching the words that provides the structure that some other right hemisphere reading methods had lacked, such as Whole Language. I am very grateful that I had the opportunity to attend Ms. Oelwein’s presentation in 2011, as it was the foundation of this research.

This program could be used easily in Learning Assistance rooms for struggling readers. As a Learning Support Teacher I have worked successfully with three students per group using this method. The two students who were not working directly with the teacher would read over their words and sentences, work at writing the words on dry wipe boards, or copy a sentence and illustrate it. They would work with each other or individually.

I don’t see the applicability of this type of program to whole class learning. It is too individualized with intensive one on one needed to be effective in a typical classroom. Once a child is reading, this type of intervention would not be necessary.

3. What does research tell us about the effectiveness of intervention for chronic non-readers? Sadly, research tells us that the methods that are effective for good readers are not very effective for non-readers. Non-readers continue to struggle, make minimal progress and remain significantly behind their peers while receiving intervention that is successful for their peers (Frijters et al., 2011; Gustafson et al., 2011; Simos et al, 2002). Chronic non-readers often have typical cognitive abilities yet they can’t manage to become fluent and confident readers.
It is disheartening to see us continue to use the same approach for all students when it is evident that not all are successful with the same methods. Just because many people learn one way doesn’t mean that all do. It is our responsibility as educators to find a method that works best for each individual.

The building blocks of reading aren’t the same for everyone, as often thought. Students that entered school knowing how to read probably never learned all of the letter sound knowledge that we instruct the non-readers with (e.g. *English words don’t end in ‘i’; a vowel says it name at the end of a syllable*). We have to embrace differences in learning and find ways to deliver learning opportunities that match each student. Sign language and Braille are examples of different ways to learn how to read and communicate. Are letter sounds the building blocks for these methods and instructions?

Left handed individuals were once forced to use their right hand to write. When will we not force right hemisphere learners to use their left hemisphere to learn to read?

4. *What does neuroimaging research tell us about how non-readers process written language?*

This was a fascinating component of my research, as it was a novel way to approach understanding how to deliver reading intervention. I had always been fascinated with the brain and learning, crediting a Cognitive Psychology class during my undergraduate studies at SFU for sparking this interest. The use of functional neuroimaging has allowed a clearer understanding of the pathways used for reading by non-readers and readers. Dr. Breznitz’s voluminous work has been very helpful in providing information that is applicable to exploring reading intervention. Her Asynchrony Phenomenon is a clear example of how the non-readers brain processes written information. Her description of the misfiring between the processing of visual and auditory input matches what I have seen many struggling students do as they tried to sound out and then blend words. Now there was a neurological explanation that allowed us to stop expecting them to just try harder, longer or for us to present it slower, louder and longer.
I was also excited to see research that said that despite the brain’s plasticity, teaching chronic non-readers with a left hemisphere approach doesn’t make lasting differences in their processing ability (Meyler and Breznitz, 2005; Froyen et al., 2011). That research helped solidify my belief that we should be using a right hemisphere approach for those students who process information that way naturally.

I would like to see this intervention used for students as early as late Kindergarten, if they haven’t started to make adequate progress despite solid classroom instruction and learning assistance intervention.
References


Breznitz, Z. (1997) Enhancing the reading of dyslexic children by reading acceleration and auditory masking. Journal of Educational Psychology 89(1), 103-113


Cambium Learning, Inc. (2004) *Read Well ®* Sopris West Educational Services, Address: Sopris West, 4185 Salazar Way, Frederick, CO


[http://www.reading.org/publications/journals/rrq/v41/i1/](http://www.reading.org/publications/journals/rrq/v41/i1/)


Golon, A. S. (2005). *If you could see the way I think: A handbook for visual-spatial kids*. Denver:


Harvey, M. W. (2011). *Union county public schools action research: Comparing early literacy interventions used in union county public schools; reading recovery vs. leveled literacy intervention*. Online Submission,


Ledoux & Gordon (2011) Disruption of spelling-to-sound correspondence map during single-word reading in patients with temporal love epilepsy. *Brain and Language 118, 1*-8


MacDonald, S. J. (2009). *Towards a sociology of dyslexia: Exploring links between dyslexia, disability and social class* Saarbrücken


McCulloch, M.T. 2003, *The Writing and Spelling Road to Reading and Writing*


Molfese, D.L., Key, A.F., Kelly,S., Cunningham,N., Terrell, S., Ferguson,M., Molfese, V.J., & Bonebright,T. Below-Average, Average, and Above-Average Readers Engage Different and Similar Brain Regions While Reading *Journal of Learning Disabilities,* Volume 39, number 4, July/August 2006 pages 352-363


Appendix

A: Teacher’s Manual .................................................................

B: Bottom Up and Top Down Reading Illustrations ..........................
A Right Brain Approach to Reading Intervention
Instructor manual

Jennifer Hedican
How to organize the intervention strategy:

1. Prior to starting any working sessions, begin with explaining the two different reading methods of top down and bottom up using template 1. A right brain approach is top down, which is the method that you will be using with the student(s).

How to organize the intervention strategy:

2. Use the Belarusian words, template 2 & 3, to demonstrate this process.

| сабака    | прытымлівацца |
| жартаўнік | працаваць    |

3. Talk with the student to find out some of the things that they enjoy. Start out broad when listing topics, as you’ll add to the list as you go. You will get more specific about the different topics as you progress. Record the ideas on the Ideas Recording Sheet, using either template 4 or 5.

4. At each session, you will choose a topic from the Ideas Recording Sheet template 4 or 5 to learn words from. Sometimes you will stay on a topic from last session. Other times you will add a new topic, depending on the student’s interest level.

5. Generate words related to that topic and record those on the Ideas Recording Sheet template 4 or 5 under that heading. Use only highly visual words, not helper words like ‘he’,
Choose four words to learn to read that session – these will be written in the 2x2 grid, template 10 and on the flashcards, template 11.

- Before you write the word on the grid, write it on a flashcard and ask the student if they can read it. If not, then record it in the 2x2 grid.
- If they can already read it, Bonus! Keep that word to use for sentence building and reading in this and other sessions. *I put a small check mark in the top corner to indicate this was an instant read for the student.*
- Once you have four words in the 2x2 grid, then the 3 stages of reading acquisition can begin.

Organizational tip: write the date on the back of the flashcards.

Record these words on the Session Words recording sheet Alphabetic Order, template 7, after the session. This facilitates building sentences in future sessions, as it is easy to see which words the student already has.

The three stages of reading acquisition are:

1. **Matching** – visually discriminate same and different
   - Read each word to the student on the flash card, one at a time.
   - Give the card to the student and ask them to match it to the word on the grid.
   - Do this for all four words
   - Do this three times in total

2. **Selecting** – selects flash card when spoken. Indicates recognition of the word
   - Place the four flash card words on table in random order
   - Ask the student to hand you a specific word
   - If the student has difficulty, point to the word on the grid and ask them to find it again
   - Once student has successfully read the word, they match the word up with the one of the grid
   - Do this for all four words
   - Do this three times in total
3. Reading – student reads the word
- Show student the flash card and ask them to read the word
- Present the words in random order
- The student reads the word and then matches the word up with the grid words

<table>
<thead>
<tr>
<th>3. Reading</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
</tr>
<tr>
<td>2</td>
</tr>
<tr>
<td>3</td>
</tr>
</tbody>
</table>

Organizational tip: Use the three stages cards, template 14, to help the student keep track of what stage they are on and how many more times they need to do that stage.
Copy on manila tag or laminate on different colored paper for durability.
Place cards on a flip ring.
Use a dry wipe crayon or a counter to mark off when they have completed one component.

9. Use the flashcard words to build sentences for the student to read. Add ‘helper words’, also written on the flashcards, to help complete the sentences as needed. Helper words are typically Dolch sight words – word without strong visual components, such as ‘with, the, in, at, to’. Record these helper words on template 8, Helper Words Record Sheet Alphabetical.

10. Ask the student to read the sentences, ensuring that they point at every word when they read it. When they get stuck on a word, give it to them right away and then have them go back to the beginning of the sentence and read it again. Record these sentences on the Session Recording Sheet, template 6, on which you have already written their new words, reread words and general progress notes.

Organizational tip: If you need to change the tense of a word, such as ‘jump’ to ‘jumps’, I record this on the front of the flashcard, in the bottom corner and get the student to read the correct tense.

11. Students can also build their own sentences and read those back to the teacher. Make ‘Yes’, ‘No’, and ‘?’ cards to build questions for the student to read, answer and build as well.

12. After the session, transfer these sentences to the computer, using template 12, to generate sentences for the student to read out next time to reinforce their words. Print out these sentences and include them in the student’s binder for them to use for fluency practice.

13. Have the student read their flashcard words from the sessions before. If the student doesn’t read a word fluently the first time, tell them the word, have them repeat it and then put the word back in the pile so they will come to it again.

14. If the student is having difficulty reading the words successfully, go back to having them select them first. Put out a selection of words that the student knows on the table, face up. Say a word and have the student select it then read it to you. Do this until all the cards are off the table. Once they have done this, then move back to the reading of these words.
Organization tip: Use plastic page protectors to store each session’s work in, as it’s easy to go back and find the words that you want. The grid and the words are kept together, which is important when you are reviewing the words, as sometimes the grid helps the student remember the word.

The next sections are examples of how to use the templates, followed by the templates.
<table>
<thead>
<tr>
<th>TOPIC</th>
<th>words about that topic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kali</td>
<td>Kali, runs, wags, digs, bury, bone, beach, dog, happy, love</td>
</tr>
<tr>
<td>Trees</td>
<td>trees, leaves, colorful, shapes, fall, tall, hammock, needles, cones, woods, animals</td>
</tr>
<tr>
<td>Sproat Lake</td>
<td>Sproat lake, sunny, hot, swim, water, ski, boat, happy, summer, friends, wharf</td>
</tr>
<tr>
<td>Dad</td>
<td>Dad, ingenious, messy, working, projects, basement, tools, creative, frugal, sleepy, love</td>
</tr>
<tr>
<td>Bikes</td>
<td>bikes, ride, brake, helmet, road, tires, fast, careful, fun, hills, exhilarating,</td>
</tr>
<tr>
<td>Classroom</td>
<td>classroom, desks, chairs, kids, parents, learning, reading, math, games, helping, active</td>
</tr>
</tbody>
</table>
Example of Ideas Recording Sheet (visual format) template 5

- runs beach
- wags dog
- digs happy
- bury love
- bone

Kali

- sunny hot
- swim water
- ski boat
- happy summer
- friends wharf

Sproat Lake

- ingenious messy
- working projects
- basement tools
- creative frugal
- sleepy love

Dad

- ride brake
- helmet road
- tires fast
- careful fun
- exhilarating

Bikes

- desks chairs
- kids parents
- learning reading
- math games
- helping active

Classroom

- leaves colorful
- shapes fall
- tall hammock
- needles cones
- woods animals

Trees
## Example of Session recording sheet template 6

<table>
<thead>
<tr>
<th>Session #</th>
<th>Date</th>
<th>Words read, Activities, Comments, Reflections,</th>
<th># of new words</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Oct 7</td>
<td>Topic - Dog. 4 new words: Kali, beach, run, dog. Helper words: my, I, is, a, on. Sentences built: My dog is Kali. Kali is a dog. My dog Kali runs on a beach.</td>
<td>9</td>
</tr>
</tbody>
</table>
Example of 2x2 grid template 10 with words chosen

Kali  beach
run  dog
Example of flashcard words template 11

Kali
beach
run
dog
Example of Helper words template 11

Student generates these words as they make sentences out of 4 flashcard words (and other words from other sessions, as applies)

* Cards would be same size as flashcards, but have been condensed here to save space.

```
my
a
I
on
is
```
Example of Sentence building

Use flashcard words to build sentences. Create ‘helper words’ as needed to make a sentence.

My dog is Kali.

My dog runs on a beach.

Kali is a dog.
Example of sentence recording template 12

After the session has ended, create sentences on the computer to print out for the student to read. The student will reread these sentences, as well as choose one to rewrite and draw about.

* The sentences can be ones that weren’t made during the session, but they must use only words that the student has already worked with.

Kali runs.

My dog is Kali.

Kali and I run.

Kali runs on a beach.
example of Sentence Write and Draw template 13

Student chooses one sentence that was typed up and then copies it on the template. They then draw a picture that matches the sentence.

Kali runs at the beach.
Templates:

1. Visual explanation of top down and bottom up reading methods
2. Your Turn to Try
3. Your Turn to Try flashcards
4. Ideas Recording Sheet (table format)
5. Ideas Recording Sheet (visual format)
6. Session recording sheet
7. Session words recording sheet - alphabetical
8. Helper words used recording sheet - alphabetical
9. Number of new words read tally sheet
10. 2x2 word grid template
11. Flashcards
12. Sentence template
13. Sentence write and draw template
14. Three components of each session
Visual explanation of top down and bottom up reading methods

**Bottom Up Reading Method Illustration**

- **Sounds**: rhymes, phonemic awareness, segmentation, phonics, blend, digraphs
- **Words**: blend sounds sequentially, Dolch sight words
- **Sentences**: words make sentences. Read controlled text
- **Meaning**: comprehension, fluency

**Top Down Reading Method Illustration**

- **Sounds**:
- **Word in isolation**
- **Whole Word/Sentences**: learned in context
- **Idea**: Personal image, emotion, connection

Template 1
Your turn to try:

- Choose one person to be the instructor and one to be the student.
- Cut the flashcard words up, leaving off the English words, or tucking them under so the instructor can remember what they mean.
- Say the words in English; don’t try to do Belarusian pronunciation! :o)
- Go through the learning sequence as outlined previously:

1. Matching: instructor shows and reads the word, student reads and matches up the word. Do 3 times.
2. Selecting: instructor displays four words, says one and student selects it and places it on grid. Do 3 times.
3. Reading: instructor shows student the word, one at a time. Student reads it and places it on grid. Do 3 time.

These words are in Belarusian

<table>
<thead>
<tr>
<th>сабака</th>
<th>прытрымлівацца</th>
</tr>
</thead>
<tbody>
<tr>
<td>жартаўнік</td>
<td>працаваць</td>
</tr>
</tbody>
</table>
Cut the flashcard words out. Ensure that the student doesn’t see the English word.

Say the words in English; don’t try to do Belarusian pronunciation! :o)

сабака  
прытрымлівацца  
жартаўнік  
працаваць  

dog  
stick  
wag  
run
<table>
<thead>
<tr>
<th>TOPIC</th>
<th>words about that topic</th>
</tr>
</thead>
<tbody>
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</table>

Student ____________ Year __________

Template 4
Ideas Recording Sheet Visual format

- Sketch

- Topic

- Words about the topic

Student __________________ Year _______

Template 5
# Session recording sheet

<table>
<thead>
<tr>
<th>Session #</th>
<th>Date</th>
<th>Words read, Activities, Comments, Reflections,</th>
<th># of new words</th>
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*Template 6*
## Session Words Record Sheet Alphabetical

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*Template 7*
### Helper Words Record Sheet Alphabetical

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*Template 8*
## Number of new words read tally sheet

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</table>

**Session #**
2x2 word grid

Date ______________ Session # __________
Sentence templates

Template 12
Sentence Write and Draw

Template 13
1. **Matching**
   - 1
   - 2
   - 3

2. **Selecting**
   - 1
   - 2
   - 3

3. **Reading**
   - 1
   - 2
   - 3

*Template 14*
References and resources:


Appendix B
Top Down and Bottom Up Reading Illustration

Bottom Up Reading Method Illustration

- **Meaning**: comprehension, fluency
- **Sentences**: words make sentences. Read controlled text
- **Words**: blend sounds sequentially, Dolch sight words
- **Sounds**: rhymes, phonemic awareness, segmentation, phonics, blend, digraphs

Top Down Reading Method Illustration

- **Idea**: personal image, emotion, connection
- **Whole Word/Sentences**: learned in context
- **Word**: in isolation
- **Sounds**: