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Part 1: The Three Educational Faces of Dyslexia: Some Key Findings from Logographic and Alphabetic Phases

By D. Montgomery

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Dyslexia is found throughout the ability range although research studies tend to exclude slower learners to control some of the variables. Dyslexia can be remediated to some extent and the earlier the provision begins the more likely it is to be effective (Schiff man, p. 66 in Goldberg and Schiff man, 1972; and Clements', 1972 survey of 10,000 cases). Even though dyslexics may eventually learn to read and write they usually still have problems with spelling in adulthood especially when they encounter new and more technical vocabulary (Snowling, 2000).

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Part 1: The Three Educational Faces of Dyslexia: Some Key Findings from Logographic and Alphabetic Phases

D. Montgomery

I. Introduction

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Dyslexia is found throughout the ability range although research studies tend to exclude slower learners to control some of the variables. Dyslexia can be remediated to some extent and the earlier the provision begins the more likely it is to be effective (Schiff man, p. 66 in Goldberg and Schiff man, 1972; and Clements', 1972 survey of 10,000 cases). Even though dyslexics may eventually learn to read and write they usually still have problems with spelling in adulthood especially when they encounter new and more technical vocabulary (Snowling, 2000). 50 per cent of dyslexics also have co-occurring handwriting problems (Montgomery, 2000; Kaplan, 2000) and these can make remediation more difficult and complex. Such cases are frequently referred to remedial centres or research programme as severe.

The incidence of dyslexia is lower in languages that are more 'transparent' than English in that they have a close association between one sound and one symbol as in Turkish or Italian. This makes decoding in reading and encoding for spelling easier. English is regarded as an 'opaque' language because although it is about 40 % phonics based the rest of it is morphemically governed by units of meaning and their origins in the complex history of the roots of the English language from Latin, Greek, Norse, Anglo-Saxon and Norman French.

The normal methods of Early Years teaching of literacy skills are the teaching of 'phonics first' which involves teaching word building for reading and writing from the sounds as they are introduced. It can take about 6 months of daily tuition for children to be able to read something interesting and meaningful. The other main system is by 'Look and Say'. The key words from the early storybooks are repeatedly paired with their written forms and a basic sight vocabulary is thus built up. Phonics to help decoding is introduced after a sight vocabulary of about 50 words has been established. Most teachers use a mixture of these two approaches and what is evident is that both work best where the teacher is organised and systematic.

Research has shown that the 'phonics first' system for teaching in English leads to a lower incidence of dyslexia (1.0 to 1.5%, Chall, 1967, 1985; Clark, 1970; SED, 1978; Ferarro, 1982; Read, 1986). If the 'Look and Say' system is used then the same researches showed an incidence of 4%. The British Dyslexia Association (2018) now reports an incidence of 4 % cases of severe dyslexia and 10 % less severe. This suggests that the 'phonics first' agenda (Rose, 2006; DfE, 2014) is not being implemented. However even if it were we should still have a significant number of dyslexic children in our schools and usually there are more than the numbers predicted from the researches. It also shows that phonics as currently undertaken, whether basic, analytic or synthetic is not the answer to the dyslexic problem. It would appear to be necessary but not sufficient.

Over the 100 years since Hinshelwood, the dominant theme in dyslexia that teachers and psychologists seek to address is the difficulty in learning to read rather than spell. It has come to be the prime concern because after the period of acquisition and development of literacy skills we use reading to learn more widely across the curriculum. In addition most teachers were taught by the 'Look and Say' system and the colleges and reading experts promoted it and have argued that spelling should only be explicitly taught after children have learned to read.

> 'This conclusion – that any formal teaching of spelling should be delayed until children have started reading and are able to evolve their own strategies for understanding the nature of writing and spelling – brings the implications of research evidence for school and classroom practice into sharp focus'. (Whitehead, 2004. 186)

Spelling is thus in most instances still 'caught' (Peters, 1985) as teachers follow the 19th century tradition of teaching spelling and handwriting through

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daily copy writing of news. These 'normal' teaching methods are patently not working for dyslexics because of a failure to distinguish between the different needs in the period of acquisition of literacy and its later development.

Dyslexia can lead to significant underachievement both in school and later in life and can affect the gifted and slower learner alike. Silverman (2004) had found that the most common contribution to underachievement among the gifted worldwide was handwriting problems and this has also been found in schools in disadvantaged areas in the UK (Montgomery, 2008) and among current gifted (Montgomery, 2016). In the schools 30% of pupils had handwriting problems and one third had spelling difficulties. About 5% of those with handwriting difficulties showed specific dysgraphic writing problems. Confused in the term 'writing problems' is also the spelling problem that is not often recognised as a related dyslexia condition so it was designated 'dysorthographia' (Montgomery, 2000).

In the literature specific reading difficulties has appeared to become a synonym for dyslexia e.g. Snowling, 1991; 2005, DfE, 1997; Vellutino and Fletcher et al 2004 and most of the vast quantities of psychological and educational research have been directed to it. It is the zeitgeist.

In her response to Lord Adonis on 'Does dyslexia exist?' Snowling (2005) argued that "even if appropriate procedures for the identification, assessment and intervention of children at risk of reading problems were put into place in all schools' dyslexia would still not be diminished as it is a brain based disorder. She added that the above interventions and practices would however help to alleviate the difficulties faced by these children."

In the present research it became evident (Montgomery, 2000, 2017) that many bright children had entered school already able to read without having been explicitly taught, others quickly learnt once in school but somehow their spelling and writing never matched their reading ability. Such cases were regularly referred to or appeared in the research studies but schools and psychological services would consistently ignore them because they could read at least at grade level if not better. Adult dyslexic students on the MA Dyslexia and SEN programmes reported similar personal experiences but they still showed the usual phonological, naming and spelling deficits. What this suggested was that reading was not really the core difficulty in dyslexia and so it was no wonder the problems had not been solved/resolved. We could have been looking in the wrong place for nearly 100 years.

II. The Model for the Design of the Current Research Programme

Frith in 1985 provided a developmental psychological model of dyslexia. There were three phases and 6 steps in which sometimes reading was the pacemaker and at other times it was spelling.

The three phases were the *Logographic phase* in which dyslexics classically had difficulties moving from an early phase of acquisition in which reading is visually based (logographic), to the *Alphabetic phase* when children are able to use letter-sound associations for both reading and spelling. Later some dyslexics fail to move on into the Orthographic phase where reading and spelling are automatic and considered to be independent of sound.

This picture reflects the 'Look and Say' context in which the observations were made but the same phases or designations could be applied to the educational processes that were becoming evident, They would become the Three Educational Faces of Dyslexia and show that different remediation processes were necessary in each of the phases not the same one.

a) Introduction 1. The Logographic Face

The research methodology began as grounded research (Strauss and Corbin, 1990) with multiple case studies leading to field studies, controlled experimental designs and meta-analyses.

Earlier research had shown the educational problems dyslexics experienced as they began literacy learning. These deficits were:

- An inability to develop sound-symbol knowledge (phonics)
- Poor alphabetic knowledge (names of the letters)
- Difficulties in rapid naming of items, and left and right hands/sides
- Problems in remembering sequences of numbers (digit span), days of week, months etc.
- Lack of phonological awareness (sound-symbol awareness)
  (Liberman, 1971; Chomsky, 1973, Bryant and Bradley 1985); Bourassa and Treiman, 2003)

In the current research (Montgomery 2017) it was hypothesised that if dyslexia could be identified in the Reception class, a specialist multisensory articulatory phonogram training (MAPT) system could be implemented there. The introduction of the articulatory element had been found to be the dyslexics' missing link in earlier controlled experimental research with alphabetic phase dyslexics (Montgomery, 1997a).

It was proposed that earlier facilitation of phonic and alphabetic knowledge in the acquisition phase could close the gap between dyslexics and the rest and could help overcome general underachievement in the disadvantaged.

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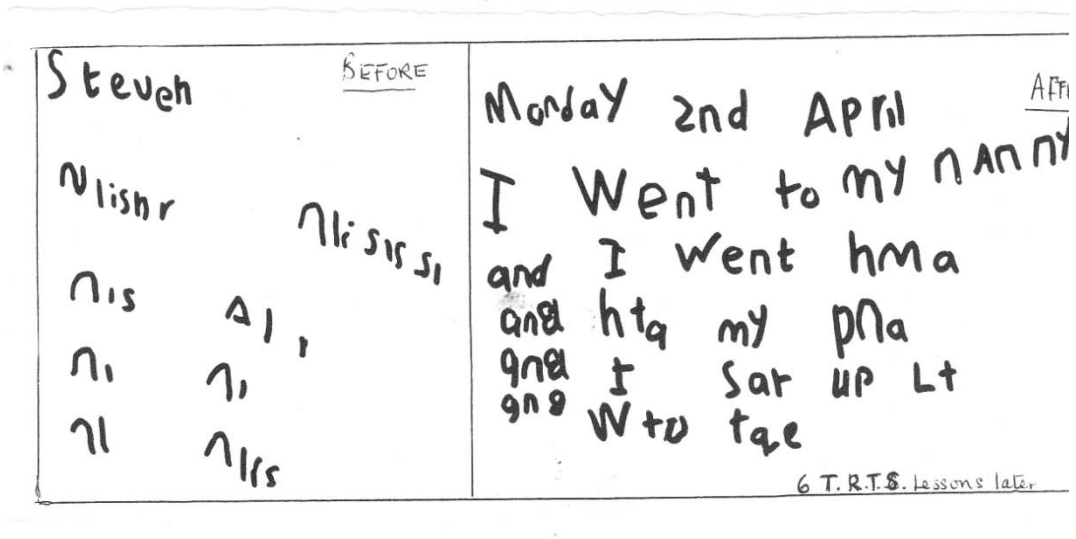
In the cases of normal spellers Gentry (1981) had identified two steps that occurred within the acquisition or Logographic phase. The first was *pre-communicative* in which the children made unreadable scribbles and marks to represent their messages or as they told a story. The next step was *pre-phonetic,* this was the creative or invented spelling stage where a single letter or 'phone' might represent a word or a group of letters and some meaning could be identified. Dyslexics showed the same characteristics, there was a failure of the potential dyslexic to move into the pre-phonetic stage. This was only observable in their written work (Read, 1986; Montgomery, 2007).

Steven aged 6.5 years before and after 6 x 20 minute lessons using TRTS (Teaching Reading Through Spelling, see alphabetic section below)



Pre-communicative phase Early pre-phonetic phase

Figure 1: Shows the typical spelling of a dyslexic

Once begun on the literacy journey the reading and spelling errors of dyslexics did mot differ significantly from those of normal subjects (Montgomery, 1997a; Bourassa and Treiman, 2003).

III. Method; Logographic Face

The method of investigation selected was 'story writing or news'. After one month in school the children in the Reception classes were set to write their news or story without any help from the teacher using any skills they could muster.

'The errors children make when they write are neither random nor thoughtless- examined diagnostically they reveal systematic application of the child's level of understanding'.

Rosencrans, 1998.10

In 1997-8 a pilot study had been conducted in a Hounslow infant school to promote their teaching of synthetic phonics because their spelling SATs were so poor, A handbook of 110 mini-lessons *Developmental Spelling* Montgomery, 1997b, 2017) was written for them and their news stories were collected after the intervention in Reception, and Years 1 and 2. SATs scores increased as follows.

Table 1: To show Key Stage 1 SATs results 1997 and 1998, infant school

	SATs 1997	SATs 1998
Reading	46 %	58%
Spelling	16%	44%
Writing	57%	58%
Mathematics	83%	85%

In 2012, 15 schools in a coastal area were invited to join the research project but only 3 accepted the offer. A private school in the Midlands also volunteered to take part.

The method selected was 'story writing'. Every subject would be asked to write a story or their news for the research project. They did this after one month in Reception without any help – free writing. They repeated the same task in March of the following year to find out what the Early Years tuition system had taught them. The Reception teachers received detailed individual reports on handwriting and spelling in January and June with suggestions to try Multisensory Articulatory Phonogram Training (MAPT) where relevant to connect sounds with symbols.

Emergent (free form) Spelling Assessment – Scoring the scripts

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Scripts with mainly correct and legible spelling score 10

10. Mainly correct spelling, legible, systematic word spaces.
9. More correct spelling, skeletal phonics, meaning clear.
8. Some correct words, phonics, phonetics, meaning generally clear
7. Skeletal phonics, phonetics, some words, meaning apparent
6. Some phonic skeletons, word bits and phones, some meaning.

Scores 5 Word forms, letters, phone(s) evident

4. Letters, possible phones
3. Some letter shapes and letters, in a line
2. Marks, mandalas (roundels), occasional letters, possibly in lines
1. Scribble, marks in some order
0. Random marks, no marks.

The strategy is to identify the statement that most typifies the writing sample and award that 'score' or rank. A score of 5 is pivotal in that it identifies those children who have just 'cracked the alphabetic code'. This is best seen in their attempts to make words using *'skeletal phonics or phones'* such as 'wt' for 'went', 'ws' for 'was' 'goig' for 'going' and 'se' for 'she' or single letter sounds to represent a word 'w' for 'was'. *Phonetics* would be represented by 'kwiz' for 'quiz', 'buk' for 'book' 'apl' 'nite', 'marster', 'berd', 'butiful'

Correct spelling of common words such as 'I ''the', 'and' and 'my' do not count as phonic achievement as they are so commonly used they can often be recalled visually rather than phonetically.

The reports focused upon: 1.The explicit teaching of sounds by first feeling the consonants in the mouth and mouthing them and feeling them as they wrote the grapheme – MAPT.

This was based upon previous research that found such a system was necessary for dyslexics because they appeared to have an Articulation Awareness deficit (Montgomery,1997a, 2007). This was potentially an observable sign of the neurological problem found in the 'pick up' system (James and Engelhardt, 2012). They found that when preliterate five-year old children printed, typed, or traced letters and shapes, then were shown images of these stimuli while undergoing fMRI scanning a previously documented "reading circuit" was recruited during letter perception *only after handwriting* not after typing or tracing experiences.

They found that the initial duplication process mattered a great deal. When children had drawn a letter freehand, they exhibited increased activity in three areas of the brain that are activated in adults when they read and write.. It showed that handwriting supports sound-symbol knowledge development.

Neurological studies such as this suggest that there is a system that in normal subjects implicitly connects sounds with symbols in a structured reading-rich environment even in Look and Say regimes. It appears to be facilitated in phonics regimes and by particular multisensory phonogram training in remediation programmes. In dyslexics the system appears to be disrupted so that very specific and often repetitive training is needed to overcome the initial 'phone' barrier. Geschwind (1979) identified dissociation in dyslexia in the left angular gyrus. This is where sounds and symbols would be connected (By articulatory feel/movements) but in dyslexics this connection appears to be broken. It therefore needs to be restored by overtraining, or other areas of the brain have to be taught to take over the 'pick-up' function.

Using in-air tracing of the letters then writing them freeform on the paper, the Fernald (1943) method was based upon practices in the specialist dyslexia APSL programmes (Alphabetic-Phonic-Syllabic-Lin-guistic) that use full cursive as the medium.

Two years later, In September 2014 the 3 State schools left in the project were asked to provide a further sample of their children's writing on entry into Year 2. This time it was a 10-minute free writing test on a favourite topic of the child's choice with a few minutes to think and plan what they would write. Two schools now responded (N=93 scripts). In late 2015 the SATs results from the three local schools were collected from the Government website.

IV. Results

a) Scoring the Reception Scripts

Prior to the receipt of the first set of scripts i) a spelling development rating scale and ii) a handwriting coordination rating scale were developed based on all Reception scripts already held. The critical borderline between pre-communicative and pre-phonetic spelling was found to be a score of 5. At this point the writer might use an initial sound to represent a whole word e..g. 'w' for 'was', or two letters to represent a word e.g. 'wt' for 'went' or 'lt' for 'late'. These were designated 'phones'. The range was from random marks (scores 1) to more or less correct spelling (scores 10). Inter-observer reliability scores were strong.

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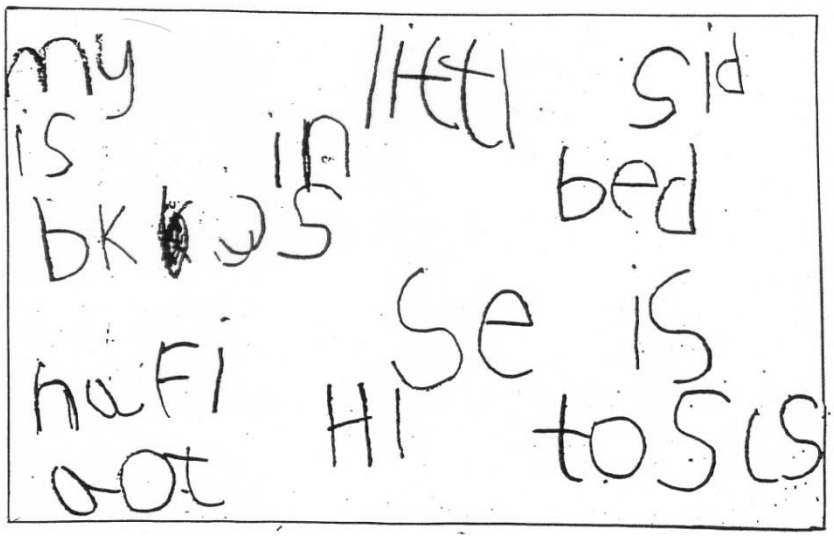

'My little sister is in bed because she is having her tonsils out'

Figure 1: Faye 5 years 1 month. (Look and Say era)

Report: On the emergent writing scale Faye would score 8. Her handwriting is larger and less under control than most but she has more spelling knowledge. If she had been given lines to write on the message would be better organised and easier to decipher etc.

Table 2 a: Shows initial socio-economic advantages in spelling scores

		Boys	Girls	N
A + B	Social housing	2.38	3.03	56
C	Owner occupier	4.52	6.81	55
D	Private school	3.34	4.06	64
		3.51	4.41	175

The scores in the above table 1 show that School C children consistently obtained higher scores than the other two schools in the same local area. This confirms the disadvantages associated with being poor found for reading in The Sutton Trust Research (Jerrim, 2013). The children here are also disadvantaged in spelling. Girls consistently outperformed boys in all the schools.

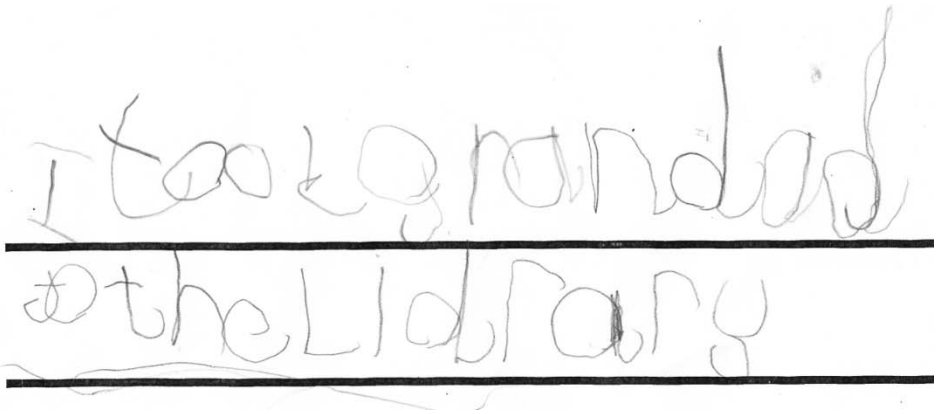

Figure 2.a: Two example scored scripts on entry to Reception 2012

James's script on entry to Reception *'I took grandad to the lidrary'*

He scores 9 for spelling. The spelling is almost correct, the meaning is clear but word spaces are not well defined yet. In comparison with Faye's script his shows some coordination difficulties. E.g. the script is faint, there is variation in pressure and 'wobble and shake' on the letter strokes. The letter bodies vary in size and some letters are 'drawn' rather made in monoline e.g. 'g' and 'y '. He scored 7 on the Handwriting checklist.

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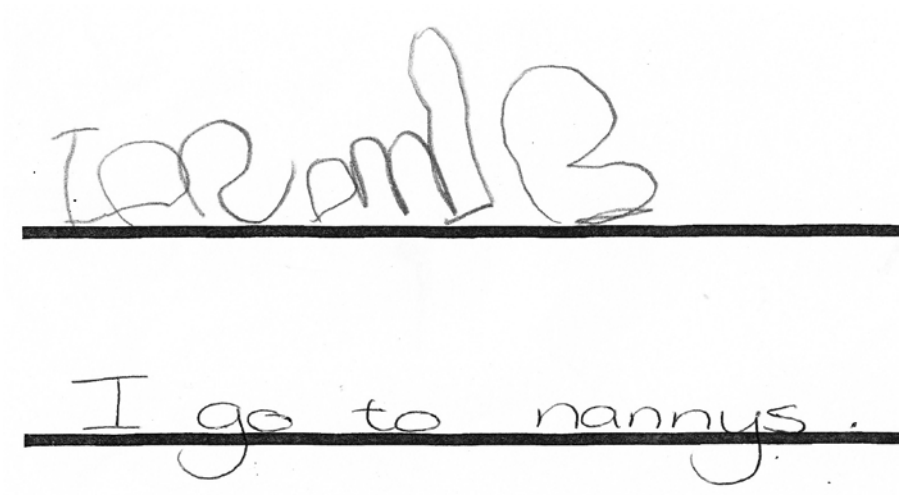

Figure 2b: Millie's writing on entry to the same class

Report: 'She scores 4 on the spelling scale as she has letter-like forms but no 'phones' as yet. She needs to be explicitly taught her sounds by first feeling the consonants in the mouth and mouthing them and feeling them as she writes the grapheme. Use in-air tracing of the letter then writing it freeform on the paper. You could begin with the 'm' in her name.'

Table 2 b: Shows the numbers of children in the 5 Reception classes and spelling scores on entry (F1) and after 5 months in school (F2)

Class	Nos	Free Writing 1	Free Writing 2	Nos 'at risk
A1	17	2.33	7.12	3 + 2
A2	18	2.44	4.3	11 +
B 1	21	3.24	6.13	4 + 2
C 1	28	6.11	6.76	0
C 2	27	5.37	6.1	5 + 3
(23=scored 4)				
111				
Private school results (F1 only, then withdrew)				
D 1	21	3.57		
D 2	22	3.5		
D 3	21	4.05		
Totals	64	3.71		

Table 2 a and 2b above the ratio of boys to girls 'at risk' from dyslexia was 1.4 to 1 and 33.. 227% of the whole cohort was at risk from potential literacy difficulties in writing after 5 months in school. This new ratio is similar to that found in an international survey by Rutter et al (2004) not the traditional 4 to 1 boys to girls.

These 3 schools were the feeder schools to the large secondary school C in an earlier Year 7 writing research project (Montgomery, 2008). In that study 18.6 per cent of the cohort had spelling difficulties that put them in the 'dyslexia zone' and one third had poor spelling i.e. they made more than 5 misspellings per 100 words (HMCI, 2001).

The Year 2 follow-up study 2014 -2015

The children in the original Reception classes were followed-up again when they entered Year 2 and all the subjects had passed the basic phone test and could write readable messages. Only one, Freddie, exhibited dyslexic symptoms:-

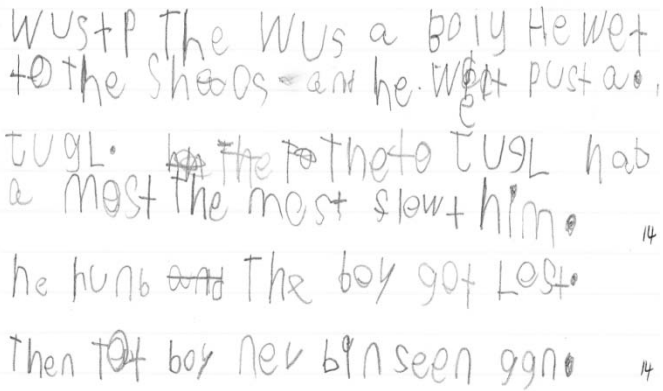

Figure 3: Freddie's writing on entry to Year 2

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He writes: *'wusrp. The wus a Boiy He wet to the sheoos – and He wet pust a . tugL. The to tugL ~~bin The to~~ hat a most The most (monster) slew + him. . he runb ~~and~~ the boy got lost . . then tat boy nev bin seen agn'*

He writes at a speed of 4.9 words per minute which is significantly slower than for the age group as a whole (e.g. 7 to 8 w.p.m. in cohort studies Montgomery, 2017)). It is faint and variable in pressure.

Of all the scripts from the Year 2 classes the one in Figure 3 above was the least decipherable and contained the most primitive spelling. It is typical of spelling seen in the scripts of older or early recovering dyslexics.

At the end of Year 2 the schools taking part in the Writing Research Project were entered for the national SATs and the results are shown below.

Table 3: Key Stage 1 SATs results for the three project schools

	2011	2012	2013	2014*	2014		
					Reading	Writing	Maths
School A	35%	47%	48%	78%*	85%	80%	66%
School B	37%	37%	50%	66%*	76%	78%	46%
School C	77%	87%	88%	96%*	95%	98%	96%

The Project children in all three schools showed significant improvements in their results compared with the three previous years. The literacy improvements in the low SES schools were in the region of 30% and 10 % in the already high scores of the middle SES school C.

After 19 months the main factors affecting the cohort's achievements were residual handwriting coordination difficulties, legibility and orthographic spelling problems. Analysis of the scripts also revealed factors about the current teaching methods in the Reception Year and that 'Phonics First' and synthetic phonics were not much in evidence. Guided letter formation sky writing, and the use of lines to write on would be prominent in a list of advisory points as well as removing tracing and copying from the schools' agenda.

V. Conclusions: Logographic Face

Targeting phones using MAPT is something that can easily be done by Reception teachers and assistants to overcome both dyslexia and social disadvantage and widely increase achievement.

The design and use of the spelling rating scale enabled the targeting of teachers' attention to the need to concentrate on developing 'phones' for use in both reading and writing. The training in the Developmental Spelling approach could also be used to promote the acquisition of alphabetic knowledge and word building that Freddie would need. Systematic teaching of handwriting form and pencil hold would help if also included.

Analysing children's freeform marks on paper will show the children's level of knowledge of the literacy concepts and skills that have been learnt. Then by incorporating MAPT and the developmental synthetic spelling programme they can speed up literacy learning.

The literacy problems observed here appear to arise from the global approaches advocated for use in the Early Years literacy acquisition approaches for some very specific tasks. In addition the current EYFS strategy speed of learning 4 to 5 new letters and combinations by visual strategies each week is initially too fast for many of these children and the first letters chosen are not necessarily the easiest for grapheme formation for beginning writers whereas the set- i t then p n s has a proven track record and gives many words and blends. The exposure to many other letters in the graphic shape groups (c a o d g), to the range in story books and in copy writing modes can be very confusing to disadvantaged and dyslexic beginners.

Join the P.E.A.R.L. project via the LDRP website. 'Promoting and Enhancing Achievement in Reception Learners - PEARL'

VI. The Alphabetic Face of Dyslexia

a) Introduction

Dyslexia in the alphabetic stage is observable as very poor reading and spelling, well below the pupil's age and ability and a lack of progress despite extra support. The school will refer the pupil to the educational psychology services for a diagnosis. This will involve testing using an individual IQ test usually the latest version of the Wechsler Intelligence Scale for Children (WISC–V) and associated reading and spelling tests and any further tests considered necessary. In administrative terms the decrement has to be 20 per cent between the literacy skills and IQ with literacy the poorer in order to qualify for Statementing and specialist dyslexia tuition.

In terms of actual skills the pupil in the alphabetic phase may have acquired some phonic and some whole word knowledge but the knowledge is insecure and incomplete. The pupil often does not know the sounds and names of all the 26 alphabet letters, may have problems with alphabetical order, remembering the days of the week, months of the year and naming left and right side. Because currently no

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attempt is made to address dyslexic difficulties in the Logographic phase all dyslexics with no phonic skills up to those with some in the late alphabetic phase will need to be placed upon an APSL (Alphabetic-Phonic-Syllabic-Linguistic) specialist remedial programme to build in what they have not learned so far.

In comparison with peers the skills of dyslexics at 6 or 7 years are at the level of a Reception learner in the Logographic phase like Steven Figure 1 above. At 10 years the skills may be at the level of a 6, 7 or 8 year old. Reading accuracy will be lower than reading comprehension scores on the Neale Analysis of Reading Ability –NARA (Neale, 1997), an indication of the potential higher ability

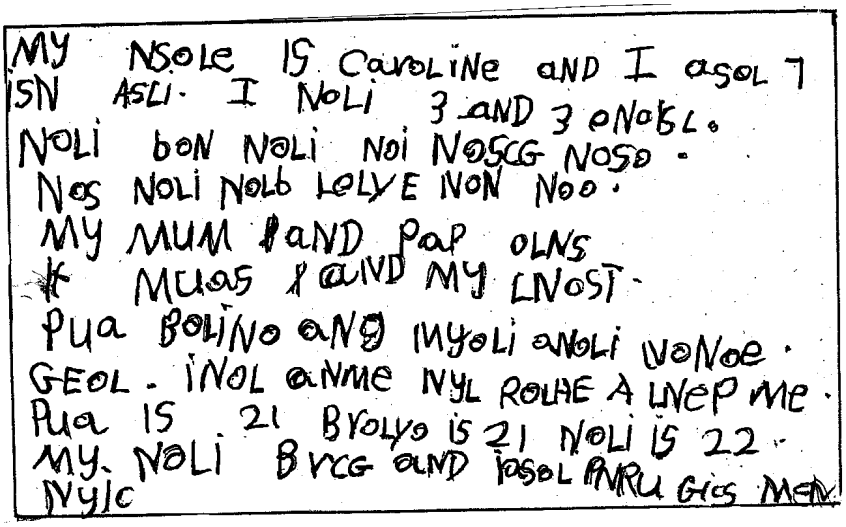
Spelling will generally be at a lower level than reading and attempts at word building may not succeed beyond the regular consonant-vowel-consonant (CVC) level. In attempts to spell more difficult words they resort to simple phonetics that can be distorted by their mispronunciations or dialect patterns.

Dyslexics with very good visual memories may read at grade level but have very poor spelling. These were termed 'dy sorthographics' and present special challenges for the school diagnostic and Statementing system.

Poor spellers' in their attempts to learn spelling lists for their weekly tests may spend a lot of time on the task only to become muddled and score poorly however hard they try. It can be very disheartening and stressful leading to psychosomatic illnesses and truancy in some severe cases.

In a spelling test Gavin wrote 'box' for 'parcel', a semantic substitution showing the lengths to which a pupil will go to try to do what is asked. In free writing dyslexics report selecting words they know they can spell rather than the word they really want to use and this of course slows down the writing process and the extra cognitive processing can interfere with compositional abilities and quality.

Poor handwriting skills or any tendency towards coordination difficulties will create further problems for the dyslexic not only in acquisition in the Logographic stage but also later in the remedial programme for the Alphabetic phase. It will cause them to avoid writing whenever possible and lose opportunities for developing automaticity and learning more spellings.



Caroline, 7 years

'My name is Caroline and I am 7 years old. i have 3 brothers and 3 sisters. Some of them live at home and some of them do not. My mum and dad live at home and so do my goldfish. Paul, Breda and Mark still live at home. They are a lot older than me. Paul is 21, Breda is 21 and Mark is 22. My other

Caroline Year 2(Aged 7) Figure 4 a

Figure 4 a, b, c: What dyslexia looks like in the alphabetic phase

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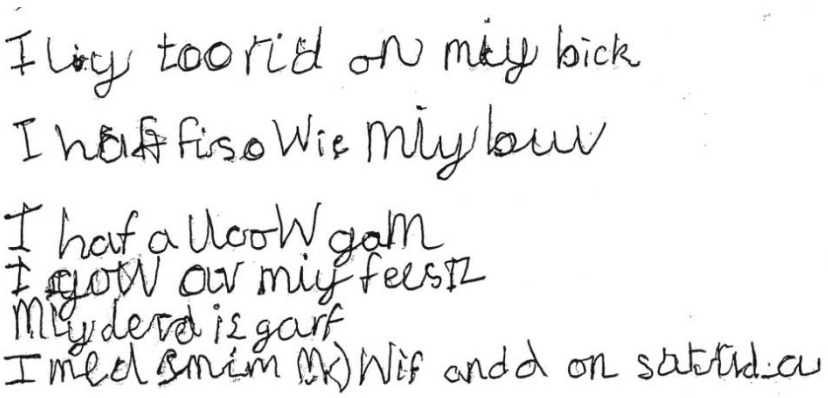
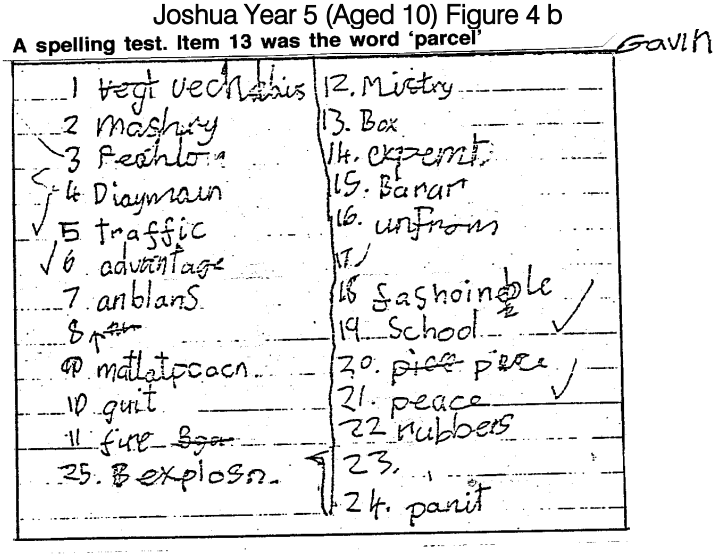


Joshua Year 5 (Aged 10) Figure 4 b



Gavin, Year 6 (11 years old) Figure 4 c

Why does dyslexia arise?

How was it possible for normal learners to learn sounds and their symbols without being explicitly taught and then use this knowledge to build their reading and writing skills whilst dyslexics could not? Something was missing for dyslexics.

How could the clever alphabet system of writing be invented? Presumably a dyslexic could not have done it. Researching writing systems showed that the alphabet system was invented only once in history and by the Phoenicians. They spoke a Semitic consonantal language (Gelb, 1963) and it had 22 consonants. A Eureka moment! Consonants have a distinct articulatory pattern or feel in the mouth. This order in a syllable can be detected whereas we cannot hear the sequence (Liberman and Shankweiler et al, 1967) e.g. ws for was. tp for top. This accounted for the way in which children's spelling developed naturally in the logographic phase.

The hypothesis therefore was that dyslexics would have an articulation awareness problem whereas normal learners would not. A series of pilot studies (Montgomery, 1981, 1984) showed evidence for this and the hypothesis was tested and the results are shown below in Table 5 (Montgomery,1997a)

Table 4: To show mean scores on phoneme segmentation (PS) and articulation awareness (AA)

	Nos	Reading Age	Spelling Age	PS (15)	AA (10)	IQ	Chron age
Controls	84	8.61	8.02	11.94	7.75	110.03	7.94
Dyslexics on TRTS	114	7.95	7.62	10.27	4.31	110.43	12.90
Dyslexics Waiting	30	6.71	6.0	4.13	5.87	112.67	8.97

Key: PS Phoneme Segmentation (sing minus 's' gives 'ing' etc.) a 15 items test.AA Articulation Awareness. Test of 10 items

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The above table shows that dyslexics already on the TRTS programme have good scores on the phoneme segmentation test of 15 items of increasing difficulty in comparison with those on the waiting list and close to the scores of much younger controls with similar reading ages. The dyslexics' scores on the articulation awareness test were significantly lower both in the dyslexic group on the programme and on the waiting list. It was odd to discover that when making e.g. the 'l' sound many of them could not say where the tip of their tongue was touching or if the mouth was open or closed.

In a follow-up study in the same project 134 Reception learners were tested on the AA test and it was found that 4 of them had no awareness of where in the mouth their tongue was touching, or whether their lips were open or shut etc. The AA test was added to an LEA infant screening survey (Forsyth, 1988) and was found to be the only test in the set that had good predictive capacity for poor reading results at 7 years.

Neurological research by Geschwind (1979) indicated that a dissociation problem in the left angular gyrus could interfere with the process of associating sounds with symbols during reading acquisition in dyslexics. This could be cutting the articulatory information link.

More recently Waldie and Haigh et al (2013) showed over-activation in the right hemisphere regions of the putamen and precentral gyrus during both regular and pseudo word lexical decision-making. No specific specialisation has been attributed to the putamen but it is involved in regulating movement and is thought to have a role in implicit learning that plays an important role in normal Reception class literacy learning. The precentral gyrus is also associated with initiating the onset of movements and Waldie et alsuggested it is likely that this activity reflects increased reliance on silent articulatory processes. Another study that provided empirical support for theview that a letter-speech sound-binding deficit is a key factor in dyslexia was by Aavena and Snellings et al, 2013). These studies may indicate that in the remedial process the intact right hemisphere areas are activated and support or take on the functions of the left in the Alphabetic phase.

We know from work with stroke patients that early intervention is very important and that the initial stages of retraining are slow and difficult and this is mirrored in the early intervention period with dyslexics. The first few sounds and letters can take hours or even weeks to acquire but once the dyslexic has achieved this the whole process speeds up

The remedial programmes that demonstrate the best effects in the Alphabetic phase must give dyslexics at least 2 years uplift in reading and spelling in one year to enable them to 'catch up' with peers (Vellutino, 1979; Montgomery, 2007). So far in this research the programmes that do this are found to be the Hickey Multisensory Language Course (Hickey, 1977; Augur and Briggs, 2nd edition, 1991) and (TRTS) Teaching Reading Through Spelling (Cowdery et al, 1983-87; Reprint,1994). They are both anglicised versions of the original Gillingham and Stillman Programme (1956, 1997) and the 4 TRTS authors were trained by Miss Hickey.

These programmes address the dyslexics' basic problems in the acquisition of alphabetic and phonic knowledge as well as teaching syllabification and linguistics in the later stages. They do this by applying an initial rigorous multisensory phonogram training system giving as much attention to spelling (and writing) as reading. Joined up or cursive writing with lead-in strokes are an essential component with a clearly defined purpose.

Hornsby and Shear's Alpha to Omega (1977) although popular and widely available is built upon Hornsby's speech therapy background rather than an educational ethos and does not insist on cursive. The 5 vowels are introduced together which can prove problematic.

Over decades data was collected from several hundred dyslexia teachers on B.Ed and MA SpLD and SEN degrees to identify programmes that fulfilled the 2 year uplift criterion and remediated reading, spelling and handwriting difficulties. So far the only successful ones have been those based on the original Gillingham and Stillman (1956) programme brought to the UK by Sally Childs (1963) and anglicised by Kathleen Hickey (1977). Details of the studies and descriptions of the programmes and why they work can be found in the following (Montgomery, 1997a, 2007, 2017). Stating the amount of uplift in terms of Standard Deviations was found to be less understood by parents and teachers and so avoided.

The Phonological Assessment Battery (PhAB, Frederickson and Frith et al, 1997) is widely used to test phonological skills and takes about 40 minutes to administer individually. There are 8 phonological tests and two supplementary tests.

The phonological tests are:

- Alliteration – segment the initial sound, includes digraphs
- Rhyme – identify same end segments, analogies e.g. c-at, s-at
- Spoonerisms i) 'cat' with an 'f' gives??
- ii) 'King John' gives 'Jing Kong'
- Non-word reading (phonics needed here)
- Naming speed (pictures)
- Naming speed (digits)
- Fluency (alliteration) generate /k/ words e.g. car, cup, cook
- Fluency (rhyme) generate '-at' words e.g. cat, fat, sat

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All these tests except the naming speeds require secure phonic knowledge. Even naming speed involves verbal processing with which dyslexics are known to have difficulty. More specifically the other 6 sub tests can only be undertaken if we have some spelling knowledge, in particular phonics. My argument therefore is why not give them a letter sound test and a graded spelling test. it would take less time and we should know exactly which sounds they did know. Training could then be more precise using the APSL approach.

Bryant and Bradley (1985) and Bradley (1981) trained their experimental group of pre-readers how phonemes were represented by graphemes using plastic letters to make words (sound –symbol correspondence). After 40 ten-minute sessions over two years the experimental group was 4 months ahead of the control groups. Another two years later at age 8/9/years they were two years ahead of those controls who had received no training and were three months ahead of the 300 children who had originally performed well on the rhyme test.

Although Bryant and Bradley claimed that the training was 'phonological' it was just another term for teaching a spelling strategy that can be found in dyslexia programmes.

> 'The particular advantage gained by the children taught to understand the connection between sound categories and orthographic spelling patterns suggests the two together make a formidable contribution to children's early progress in spelling.' (Bradley and Huxford, 1994. 410)

(Bradley and Huxford, 1994. 410)

When Simonson (2008) tested the effectiveness of phonological awareness training in her MA SpLD research project she compared the use of HMLC with LTK (Language Tool Kit, Rome and Osman, 1994) she found that the phonological training did improve the phonological skills significantly but did not transfer to the spelling performance on tests and in their free writing. Those trained on HMLC were not so good on the phonological awareness tests but their spelling skills were much improved.

Thus if we get straight on with symbol-sound correspondences and spelling teaching we save time and focus on the very specific needs of the dyslexic.

The structure of an APSL lesson:

1. Alphabet work (Selecting and laying out the wooden capital letters in an arc and naming them)
2. The reading pack work
3. The spelling pack work
4. Dictations
5. Games

Example of the APSL multisensory phonogram training for letter 'd'

After the alphabet work the reading pack work follows. There are 84 cards in the TRTS reading pack and 51 in the spelling pack. The order of introduction of the first 16 letters is i,t,p,n,s,a,d,h,e,c,k,ck,b,t,m,y,

- The teacher begins by presenting the reading pack card 'd'
- The pupil learns to respond and say /d/
- They discuss the clueword e.g. 'dog'

Table 5: Shows a meta-analysis of the relative effectiveness of APSL and Non APSL programmes (Alphabetic-Phonic-Syllabic-Linguisticprogrammes)

APSL Dyslexia Progs Progress in 1 Year.			NON APSL Programmes in 1 Year		
	R. Prog	S. Prog	R. Prog	S. Prog	Researcher
A to O N=107	1.93	1.95	0.53 N=107	0.32 (Teachers' phonic programmes)	Hornsby et al 1990
TRTS N=38 Pairs tuition	2.45		N=15 (Eclectic mix by teacher)		
(H & A to O) N=50	1.21	0.96	0.69 N=50	0.65 (SME)	Ridehalgh 1999
TRTS N=12	3.31	1.85	2.2 N=12	1.14 (SME/TRTS)	Webb 2000
TRTS N=12	4.04	3.00	(no control group)		Gabor, 2007
A to O N=10	2.4	2.4	Same group, no progress in previous year		Pawley 2007

KEY: R.Prog. Reading progress; S. Prog. Spelling progress. TRTS – Teaching Reading Through Spelling; A to O Alpha to Omega; H – Hickey Multisensory Language Course/DILP; SME- Spelling Made Easy. (Brand , 1998).

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Ridehalgh (1999) examined the results from teachers who had undertaken dyslexia training courses at Dyslexia Centres around the UK. The factors she investigated were length of remediation, frequency of sessions and size of tutorial groups in dyslexic subjects taught by three different schemes - Alpha to Omega (Hornsby and Shear, 1993), Dyslexia Institute Language Programme (DILP/Hickey, 1995), and Spelling Made Easy (SME, Brand, 1998). She found that when all the factors were held constant the only programme in which the dyslexics gained significantly in skills above their increasing age was Alpha to Omega.

However in a follow-up she found that the users of the Hickey programme in her sample had found it more convenient to leave out the spelling pack work and the dictations! The data also showed that in **paired** tuition the dyslexics made greater gains than when working alone with the teacher (see table 5.2 below) This is an important consideration in terms of the dyslexics' progress and of economics in schools. All the four tutors in the 1997a TRTS study worked with matched pairs of pupils.

Webb found that she had to cut out the dictations and some of the spelling-pack work because the allocated time for lessons was too short. As can be seen this has had an effect on the spelling results. She also found that in using SME the pupils were not making progress unless she introduced the multisensory mouth training from TRTS to link the sound and symbol. This accounts for the better SME results than for Ridehalgh's groups.

In Gabor's study at an international school the high progress dyslexics had supportive backgrounds and were encouraged at home to do the homework.

Pawley's study took place with 10 pupils placed in a London special school for Emotional and Behavioural Difficulties (EBD). In the previous year the group had made no progress with their literacy skills. He found that as their reading and spelling improved the incidence of EBD decreased by 30.7%. Before and after the programme the incidence of behavioural problems were independently recorded on the Connor's EBD scale (2007).

Table 6: To show the impact of pairs versus single tuition and progress in one year (Ridehalgh, 1999, p. 52

Programme	Reading		Spelling		Totals	
SME	Single	Pairs	Single	Pairs	R	S
N=50	0.71	0.66	0.79	0.5	0.69	0.65
DILP	0.69	1.59	0.66	0.96 }		
A – O	0.47	1.19	1.19	0.87 }		
N=50.				DILP+A-O	R =1.21	S=0.96

The use of SME shows pupils regressing in each year in all conditions whereas the use of the Hickey based DILP programme and A to O show greater progress with pairs tuition (except in spelling for A to O). Ridehalgh also found that the spelling progress with DILP was 1.06 in the first 6 months but dropped back thereafter (0.54). This shows the importance of the initial multisensory alphabet and phonics training.

Spelling progress at different years showed:

- A to O was most effective at 7 and 11 years.
- DILP was most effective at 8 years. This was without the use of the spelling packs and dictations.
- SME was of most value at 12 and 13 years.

In a separate project Roycroft (2002) used DILP for four months with 10 dyslexics in pairs, twice per week and found that they made 1.4 years progress in reading and 2.5 years progress in spelling. 10 Controls in pairs given standard reading and writing support made 0.2 months progress in reading and 0.1 months progress in spelling in the same 4 months. All these results suggest that we might use an APSL programme for six months or one semester then stop so that there can be a period of consolidation. One semester or a term and a half should give an uplift of at least one years' progress.

Various commercial programmes have borrowed elements from HMLC and TRTS and have given poorer results when cursive is not included or spelling is not given due weight, Games approaches have also proved useful and popular butwork best as part of the schemes e.g a typical HMLC/TRTS lesson follows this pattern: 1. Alphabet arc work with capital letters and letter names, 2 Reading pack, 3.Spelling pack, 4. Dictations and 5. Games. Such a lesson takes 50 minutes, but can be split into two related sessions.

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We need to broaden the search to find effective and short term intervention programmes that have the maximum benefit for dyslexics and is also cost effective for schools. Current 'programmes' can go on for years and years without such benefit and new tutors take the dyslexic over the same ground year after year. The dyslexics know this and their knowledge and feedback are important in the investigations.

Teachers in the UK have claimed that among others 'Toe by Toe' and Language Tool kit have proved useful. In the USthe Slingerland Methodand the Spalding Road to Reading are popular. They are multisensory structured language programmes that

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include modified Orton-Gillingham methods written by Orton students.

Other schemes are no doubt effective but the data is not available in comparative terms such as presented in this meta-analysis to be able to check the facts and follow them up into research studies. Contributions of single cases and group or controlled studies are therefore invited, make contact through the LDRP website www.ldrp.org.uk so their data can inform the studies. All proper attributions and copyright will be recognised and respected.

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