

## Case Studies

### *Detailed Assessment of Speed of Handwriting (DASH):*

What the DASH can tell us about a child's handwriting in addition to speed, and how it can assist in planning intervention

by  
**Angela M. Webb**

Angela Webb is a specialist teacher with 20 years experience working with children with poor coordination who find handwriting difficult. She is currently doing her PhD on the relationship between handwriting and written composition in children with motor coordination and/or attention problems.

#### *Background*

Two eleven year old boys from the same year group in the same secondary school, though not in the same class, were referred to me independently for a handwriting assessment. In both cases, their teachers reported that the boys, Alex and Billy\*, were bright and verbally fluent but had unexpected difficulty with tasks which involved handwriting. They often produced work which was difficult to read and both parents and teachers were concerned that the grades they were being given in school underestimated their true ability. Alex had been fully assessed by an educational psychologist who had recorded a verbal IQ of 132 and noted that his lack of motor coordination might be a factor worth exploring further. Billy, on the other hand, had not been assessed previously but had been referred on this occasion by the special needs coordinator at the school. Both boys were left-handed and their pen-grips were similarly awkward and unconventional.

\*Names have been changed to maintain confidentiality

#### *Comparative profiles*

##### **Alex**

**Age:** 11 years 8 months

**Handedness:** Left

**School:** Comprehensive

**Year:** 7

**Referred by:** Educational Psychologist

##### **Billy**

**Age:** 11 years 8 months

**Handedness:** Left

**School:** Comprehensive

**Year:** 7

**Referred by:** Special Needs Coordinator

### Alex pen grip



### Billy pen grip



### Samples

She has ~~is~~ quite a long nose and wears glasses. She isn't particularly tall. ~~She~~ often sits on her desk ~~and~~ She has a quite kind face. She is Irish. She often wears green, gothic clothes and ~~is~~ ~~has~~ her wall in her classroom about Irish Goths. She is about 50 years old. Her skin is quite pale. She is often very busy. ~~is~~

Fig 1a: Everyday writing sample Alex

He normally wears jumpers with shirts underneath and he is quite near retiring. ~~the~~ next year he looks about 60-61. He isn't very variable and he doesn't like answering his pupils' questions.

Fig 1b: Everyday writing sample Billy

### *Teacher comments*

#### **Alex**

“Punctuation and spelling a little erratic but the chief concern is handwriting which is almost illegible, especially when the imagination is engaged”.

#### **Billy**

“A quick and able boy whose handwriting is cramped, untidy and barely legible”.

### *DASH findings*

Both boys were tested on the *DASH*, following the instructions provided in the manual. Although the five tasks were administered in the required order, they are discussed out of order so that the differences between the boys can be highlighted.

#### **Alphabet Writing (Task 2.)**

This involves writing from memory at speed.

Alex managed to write 64 letters in the one minute allowed, giving him a standard score of 12 which is average for his age, whereas Billy scored 87, a standard score of 15, placing him between 1 and 2 Standard Deviations (SDs) above the mean.

#### **Difference between best and fastest copying (Task 1. Copy Best and Task 3. Copy Fast)**

Figure 2a and b show the difference between the boys’ attempts to copy the ‘quick brown fox’ sentence in their best and fast handwriting. Figure 3 illustrates the difference in the scores they obtained.

*See samples on next page*

The quick brown fox jumps over the  
lazy dog.  
The quick brown fox jumps o

Fig 2a(i): Best writing sample Alex

The quick brown fox jumps over the lazy dog.  
The quick brown fox jumps over the lazy dog.  
The quick brown fox jumps over the lazy dog.  
The quick brown fox jumps over the lazy dog.  
The quick brown fox jumps over the lazy dog.  
The quick brown fox jumps over the lazy dog.  
The quick brown fox jumps over the lazy dog.

Fig 2b(i): Best writing sample Billy

The quick brown fox jumps over the  
lazy dog.  
The quick brown fox jumps

Fig 2a(ii): Fastest writing sample Alex

The quick fox jumps over the lazy dog. The quick fox jumps over the lazy dog.  
The quick fox jumps over the lazy dog. The quick fox jumps over the lazy dog.  
The quick fox jumps over the lazy dog. The quick fox jumps over the  
lazy dog. The quick fox jumps over the lazy dog. The quick fox jumps over the  
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Fig 2b(ii): Fastest writing sample Billy

When asked to produce his best handwriting, Alex produced 7 words per minute (wpm). This translates to a standard score of 4 which is on the 2<sup>nd</sup> percentile and 2

SDs below the mean. When asked to write quickly, he also scored 7 wpm, giving him a standard score of 3, between 2 and 3 SDs below the mean. In contrast, Billy achieved 27 wpm when writing in his best handwriting, a standard score of 16 which is on the 98<sup>th</sup> percentile and 2SDs above the mean. He then increased his speed to 39.5 wpm, giving him a standard score of 17 which is on 98<sup>th</sup> percentile and more than 2 SDs above the mean.

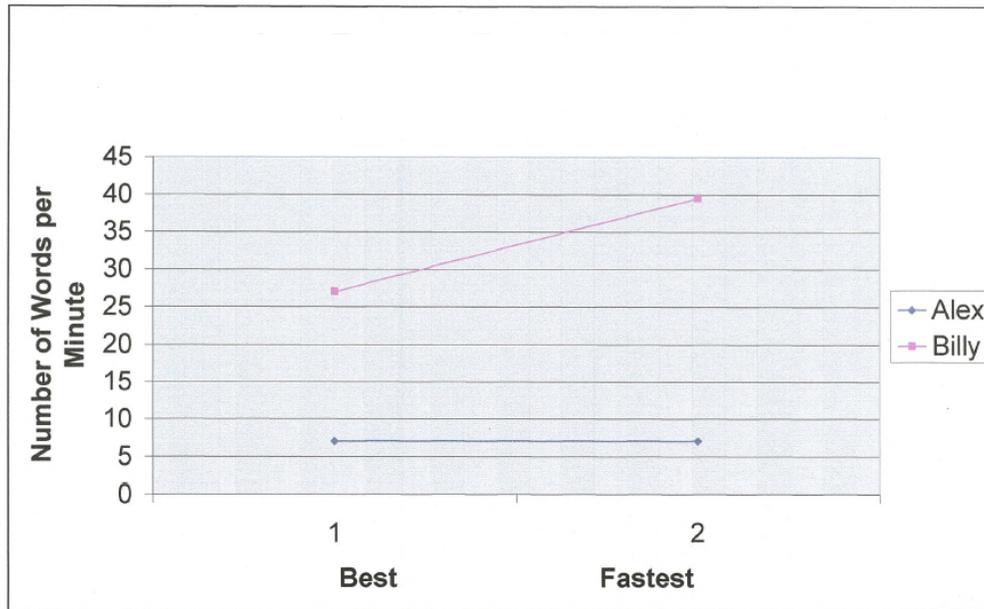


Figure 3: Comparison in number of words written per minute between boys in both conditions

When the difference between the number of words in the ‘best’ and ‘fastest’ tasks were examined, the difference for Billy was 12.5 words, well above the mean for his age (Alex’s score difference was 0). Although accuracy and legibility are not measured objectively in the *DASH*, inspection of the writing shown in Figure 2, suggests that neither boy’s writing changed much, which was rather unusual. Normally, we find that responding to speed instructions leads to deterioration in legibility but for these boys their writing was equally irregular and difficult to read on both versions of the task.

**Free Writing (Task 5.)**

Alex achieved 12.7 wpm on this task, a standard score of 7 which is on the 16<sup>th</sup> percentile and 1 SD below the mean, whilst Billy achieved 31 wpm, a standard score of 17 which is on the 98<sup>th</sup> percentile and more than 2 SDs above the mean.

**Graphic Speed (Task 4.)**

On this task Alex made many errors and obtained a score of 17, giving him a standard score of 6 which is on the 10<sup>th</sup> percentile. Billy scored 33, giving him a standard score of 10 which is on the 50<sup>th</sup> percentile.

## *DASH summary*

Alex and Billy are both boys who had difficulty with handwriting in school. In both cases, the *DASH* tasks provided data which allowed me to go further than simply saying their writing was cramped, untidy, illegible etc. In Alex's case, the *DASH* showed that he wrote slowly for his age and was unable to increase handwriting speed on demand. There was evidence of this slowness across all of the *DASH* tasks, suggesting that he would have great difficulty in the classroom when copying home work, writing to dictation, writing essays and, of course, taking exams. In contrast, the *DASH* showed that Billy could write fast enough even when writing his best, could increase speed when required and could sustain this rate of writing in his free writing. Thus, while both boys need help with their handwriting, the marked difference in the *DASH* results of these two outwardly comparable boys led me to quite different decisions as to how best to move forward in each case. Clearly, a blanket approach to intervention would not be appropriate.

## *Next steps*

Alex's *DASH* results supported the idea that he had a more significant motor difficulty than Billy. To be sure of this, the boys were given three more tasks using a writing instrument and Alex was additionally tested on the *Movement Assessment Battery for Children (Movement ABC-2)*, Henderson and Sugden, 2007. During the 'writing' tasks, the possibility of altering their pencil grip was explored with both boys.

**1. Writing the alphabet without time pressure.** On this task, Alex demonstrated that his letter knowledge was good and that the formation of his letters was correct in all but one instance, despite performing slowly and using great effort to produce them. In contrast, Billy wrote several letters which were not clearly formed and the correct movement was not used in f, s, m and k. Again, he performed these at a consistently fast speed.

**2. The 'Lazy 8s' task:** This task is one commonly used by therapists and teachers in the field. The child is asked to produce a horizontal figure of 8 or 'Lazy 8', first with and then without an outline, continuously for 10 'laps'. Like the graphic speed task in the *DASH*, it is designed to assess the degree of motor control a child has when using a pen or pencil.

On this task, Alex had great difficulty. He could not perform controlled, smooth movements, particularly when crossing the midline. Instead of the movement being confined to the arm and hand, his whole body swayed while he did it. Interestingly, Alex could not perform the exercise without the outline, as he was unable to coordinate the essential crossing movement characteristic of basic joining strokes in cursive writing. Lastly, the pressure which he used on the paper was variable and at times intense. In contrast, Billy was able to perform these movements without difficulty, sustaining a steady flow of the pen whilst keeping the rest of his body controlled.

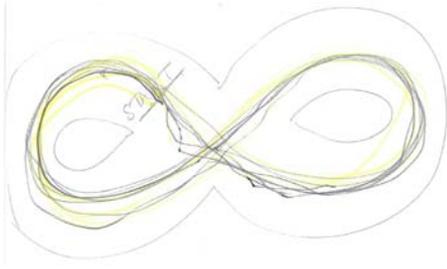


Figure 4a(i): Sample of 'Lazy 8s' with outline Alex

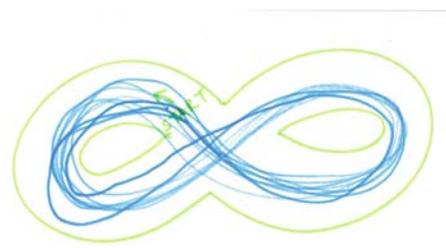


Figure 4b(i): Sample of 'Lazy 8s' with outline Billy

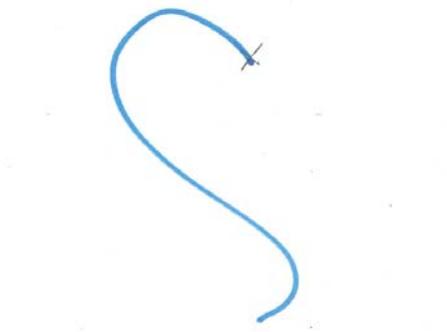


Figure 4a(ii): Sample of 'Lazy 8s' without outline Alex

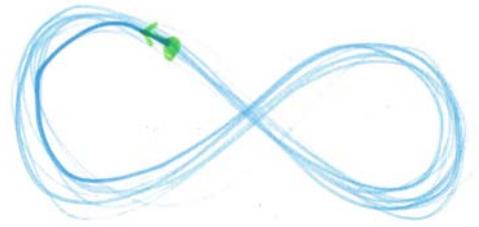


Figure 4b(ii): Sample of 'Lazy 8s' without outline Billy

**3. The 'curly hair' task.** This is another coordination exercise in which the child is required to draw looping 'e's around the outer and inner circumference of a much larger circle without turning either the paper or the body.

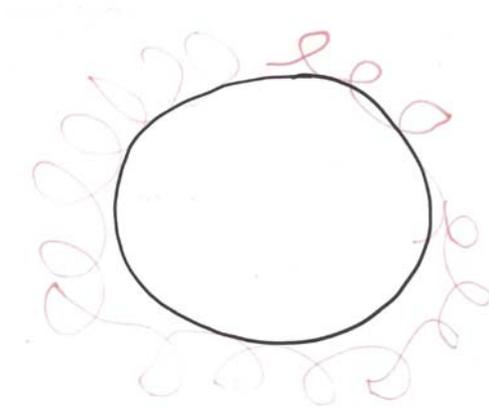


Figure 5a: Sample of 'curly circle' exercises Alex

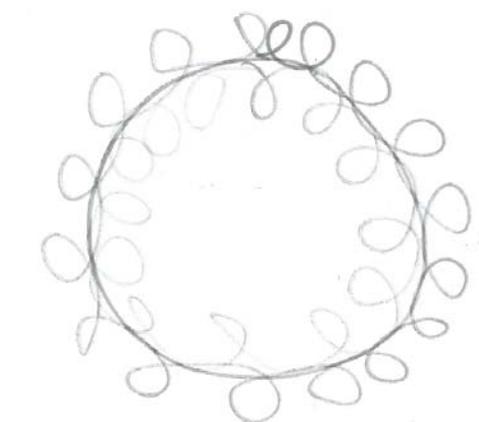


Figure 5b: Sample of 'curly circle' exercises Billy

Alex was unable to coordinate the looping movement around the circle, stopping several times and having to be redirected by the tester. Billy, on the other hand, was able to complete this task without assistance.

During these tasks, both Alex and Billy found it very difficult to adopt a different grip, and it was concluded that to make this change permanent would probably take an impracticable amount of commitment and time. The fact that both boys employed an irregular and seemingly uncomfortable grip, yet one was so much better able to vary his handwriting speed, suggests that perhaps the grip has little to do with the written outcome.

### ***Recommended interventions***

On the *Movement ABC-2* **Alex** obtained a score which placed him below the 5<sup>th</sup> percentile. In addition, his sub-optimal performance on the additional graphic tasks led me to conclude that there were developmental issues to be addressed in his general motor competence in both gross motor (with the excess movement of the body and discomfort crossing midline) and fine motor areas (with the lack of control in the circling and variable pressure). For this reason, it was suggested that an occupational or physiotherapy assessment might be a useful next step. In addition, the fact that at nearly 12 years of age he wrote so much slower than the norm and was unable to increase the speed of handwriting when required, indicated that to improve his handwriting skills to a level which would allow him to cope with the increasing demands of secondary school might be a massive task, and maybe even impossible. This led to the confirmation of the recommendation made by the educational psychologist that learning to touch-type would be essential if this boy was to realise his considerable potential at school.

With **Billy**, several indicators led me to make completely different recommendations for him. First, his *DASH* performance showed him to be someone who could write competently at speed and he had the skill to vary his performance to meet specific task requirements. His ability to maintain speeds above the norm for his age when engaged in the free writing task meant that his handwriting was basically functional, albeit irregular. This suggested that there were no major motor developmental issues to be addressed. His writing lacked neatness and consistency but, because of his competent performance on the motor circling tasks, I decided that it was worth tackling the handwriting itself, re-teaching the formation of certain letters and joins directly and working on targeted exercises to space the letters out for increased legibility. Four individual lessons were given, focusing on these aspects, which did indeed result in improved presentation (see below).

I am really passionate about music. I have an mp3 player and I ~~also~~ listen to it all the time. I like really all types of music from pop to rock. I really like Gwen Stefani. I also love my T.V. I watch it all the time. I am into only one soap and that is all, and that is *Eastenders*. I love it so much I feel like I am a character in it. I really don't like boring documentaries but I often watch the news so I know what is happening in the world. I really like to go to discos.

He is quite mean, he normally wears jumpers with shirts underneath and he is bald. He is retiring next year he looks about sixty to sixty five. He is not very sociable and he doesn't like answering his pupils questions.

Figure 6: Sample of Billy's improved writing

### Conclusion

The *DASH* provides teachers and therapists with a reliable tool to assess children's handwriting speed against the norms expected for their age. It can however provide more than simply speed results. Due to the differentiated nature of the tasks within the *DASH*, comparative performance on these tasks yields vital clues as to the nature and severity of speed problems. The unique opportunity which appeared when these two boys of the same age and educational background presented for assessment, enabled me to evaluate the extent to which the *DASH* could be used in a wider context to provide information on handwriting difficulties beyond the parameters for which it was designed. Quite clearly, the *DASH* has potential in these areas as demonstrated in the above case studies.

Henderson, S.E. and Sugden, D.A. (2007). *Movement Assessment Battery for Children-Second Edition*. London: Pearson.