**Would interventions/accommodations in the strategies for teaching drawing be useful for pupils with dyslexia who have drawing difficulties?**

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**Introduction**

At the *British Dyslexia Association* (BDA) *conference* in 2016, it was made clear by many of the presenters that the profile of dyslexia is in a state of flux. Speakers talked about high instances of co-morbidity with dyslexia, dyspraxia, ADHD and Asperger’s and the implications of this for diagnosis. (Abdulaal, 2016, pp.14,16, 43, 59,). Our previous research, based on interviews with and observations of, post-graduate art and design students at the Royal College of Art (RCA) and secondary school students, (from five London based schools), has revealed that some highly creative individuals with dyslexia and or dyspraxia feel impoverished by what they perceive as a lack of observational drawing ability. We have argued that this particular lack of processing ability can be linked to some of the processing difficulties associated with dyslexia and dyspraxia and suggested that there is a sub-group of dyslexic/dyspraxic individuals adversely affected by poor observational drawing ability. (Rankin, et al., 2017, pp. 287-304) We believe that the outcomes of this research will be of benefit to certain dyslexic and dyspraxic individuals who may be denied an art school tertiary level education because the requirements of the art curriculum as taught and examined in most secondary schools, discriminates against those who cannot produce an accurate drawing from observation. To support this statement a quote from an email received back in 2012 has been included.

In years 8 and 9 I was not very good at drawing and therefore due to the curriculum’s emphasis was not considered to be very good at art. At this point my form tutor told my mother that I was below average in the year group, mediocre at best in art. Despite the school’s lack of encouragement, I did choose to study art at GCSE. There were several others like myself who were not considered to be good at drawing and therefore did not continue with art. In the years since, a few of them have expressed to me how much they wish they had been good enough to continue with art. Interestingly like myself they too were part of the Special Educational Needs group. Fortunately for me, my parents had an art background and did not listen to my form tutor and encouraged me to continue with art. I have now gained a place on the Foundation course at Kingston university.

We are also interested in the use of drawing as a means of observing, and memorising facts about the world. This is particularly relevant in subjects, such as natural sciences and mathematics, which rely on the individual being able to accurately copy or reproduce diagrammatic images in order to gain an understanding of form and function. Evidence presented to the authors suggest that some secondary school dyslexic/dyspraxic students are severely hampered from progressing in these subjects by their inability to draw accurately. The late John Berger, well known for his influential television series based on his book, *Ways of Seeing*, pointed out in an article in the *New Statesman* that; “Drawing is an autobiographical record of one’s discovery.” (Berger, 2013) He explains that the drawing is not only a representation of the object but also an externalisation of the memory of the seeing process. In *The Tacit Dimension*, Michael Polanyi (1967, p. 4) similarly highlights the important role, observing and drawing have in combining to form; “tacit and language-less knowledge of the specimen.”

Gemma Anderson’s beautifully illustrated book *Drawing as a Way of Knowing in Art and Science,* has a number of examples of drawings both as a means of developing an understanding of these structural forms and as a way of disseminating knowledge. We are particularly interested in her views on how drawing can enhance memory; “Drawing can become powerful ‘aide memoires’ as the result of drawn experience that accumulates as a kind of memory bank of perceptual experiences, which can then be recalled by further drawing experience.” (Anderson, 2017, p.19)

In this paper when we refer to ‘drawing’ we mean specifically drawing from observation. This includes both the more complicated process of representing a three-dimensional form in a two-dimensional flattened mode and copying from a board or book where half the process has been done for you.

Drawing from observation, as Anderson (2017, p.19) states; “…represents multiple and continuous observational acts in focusing in and out through connected movement of the hand and the eye.”

She continues; “…this allows for the comparison of what is already known and what is observed, and for extending this comparison until what is known, what is drawn and what is observed are relatively consistent.” (Anderson, 2017, p.18)

The process was succinctly described in a radio interview by Chris McManus Professor of Psychology and Medical Education at University College London; “…taking in visual input, processing it through our eye, through our brain, sending it to another bit of the brain that produces motor outputs and moving our hand in just the right way to make the two look the same.” (Ledgard, 2015,)

Drawing is a complicated process. It is sequential and linear in nature, as are reading, writing and spelling. It clearly involves eye tracking, short-term memory and motor co-ordination. In addition, we would argue it is negatively influenced both by the lack of automaticity often referred to by Angela Fawcett and Roderick Nicolson (Nicolson & Fawcett, in Fawcett, 2001, p.146) and Tilly Mortimore’s (2003, pp.113-153) observations about dyslexic students’ tendencies, to be wholist thinkers, who often have trouble organising details in order to support an overall argument in written form. Finally, an argument will be put forward for an explicit understanding of drawing as a conventional code operating in ways similar to language, but with its own visual ‘vocabulary’, rules of syntax and grammar, as this has been found to be helpful during the drawing workshops held at the RCA.

**Drawing for All**

In chapter six *of Dyslexia Theory & Good Practice,* Nicolson and Fawcett referto a *‘*Taxonomy of learning’ part of which would involve‘an individual support plan’. (Nicolson & Fawcett, in Fawcett 2001, pp.156-157) The purpose of this research is, to persuade professionals working in the field, that remedial drawing strategies as described in this paper should be included in ‘individual support plans’. In order to do this and by way of illustrating our points, we have observed Individuals’ and groups’ reactions to our workshops and conducted interviews with both teachers and students, whose words we have borrowed, (both from the transcriptions of video footage and emails to the authors).

None of the strategies we put forward is rocket science but they have all been tested and proved to be helpful and our belief is that they can easily be taught by anyone with an art school education. The proposal is to call on a wider community with different insights and roles to provide additional appropriate expertise where it is needed. We believe that co-operation between art teachers and Special Educational Needs (SEN) professionals is key to preventing creative individuals from giving up on pursuing an art education. We also strongly believe that learning to draw can boost self-confidence and be a powerful tool for reinforcing memory for all pupils, art school applicants or not.

**Problems identified and addressed: *Eye-tracking, short-term memory and motor co-ordination.***

In chapter two of *Dyslexia Theory & Good Practice,* John Stein, Joel Talcott and Caroline Witton state “In dyslexics the development of the visual magnocellular system is often impaired. Clearly this could interfere with the reliable direction of visual attention and of eye movements." (Stein et al., in Fawcett, 2001, p.68) In fact, back in the early 1980s Olive Mearse first suggested that reading through certain coloured filters may make print easier to read, for children with visual reading difficulties. (Lawrence, 2011). Despite remaining a somewhat controversial subject, there is now sufficient evidence to suggest that eye tracking difficulties, often referred to as scotopic sensitivity, can occur in a minority of people with dyslexia. This is described in the 2016 BDA conference proceedings, by Ian Abbott, Marie Henderson and Paul Adler in their paper *Visual Stress, Coloured Filters and Reading Difficulty* (Abbott et al., in Abdulaal, 2016, p. 42) Although there is no agreement about how coloured filters work, it is widely accepted that if blue and yellow filters in particular, are worn, either as spectacles or used as overlays, they can greatly improve an individual’s reading.

At the beginning of the millennium in 2001, John Tchalenko (2001, pp. 35-40) carried out some interesting research where he recorded the eye tracking and hand movements of a single artist at work. The artist Humphrey Ocean, was selected for his detailed and realistic portraits produced from life. Tchalenko found that Ocean’s eye fixations were quite different from those of a novice artist, in that they were longer and less frequent than novice drawers, who were constantly darting from the subject to the drawing and back again. Ocean’s time spent mark making was in longer spurts and thus arguably more focused. During one of our RCA drawing workshops a student drawing the spine of a skeleton remarked;

I’ve noticed how quickly I lose my place which leads to inaccuracy, so I’m

starting to do this one, and as I look up I can’t actually remember which rib I was looking at, so every time I’m having to countdown the neck bones and then because I’m maybe guessing which one I’m looking at, I feel confident about one line, but then when it comes to matching it up with another angle or another line, then suddenly it’s all wrong, it’s like in a crossword puzzle where you realise the last letter is actually wrong because the next word doesn’t make sense.

Another student working on a still life similarly remarked;

So, I draw one section and then I think OK I need to keep this proportion and

then I go to another element and I completely forget about what I did before and I focus on the next element. Because I focus on the next element and I forgot the first one, then they are not part of the same picture it’s as if they are completely different pictures and then I remember why didn’t I connect to the first element.

Gilbert Ryle’s (1949) seminal work *The Concept of Mind,* presents the complicated philosophical discussion around the logic of various perceptual and observational processes. We have found an interpretation of these theories by Frank Sibley in Geoffrey Warnock’s edited book *The Philosophy of Perception* to be particularly helpful when explaining the nature of seeing to students, in particular Sibley’s clarification between the tasks and achievements of “…looking, seeing, scrutinizing, etc.” (Warnock, 1967, p.127). We have found that making explicit the task of seeing, looking, observing and scrutinising without having to produce a drawing, at the beginning of each workshop can be valuable. At this stage, the drawing tutor talks through what he is looking at and suggests ways of constructing the scene in terms of main axes, edges and negative shapes. He also emphasises the importance of staying in the same position and keeping the head still. Although we do not have empirical evidence to prove the benefit of wearing tinted lenses, students who have worn them whilst drawing have responded positively.

Within our short-term memory, the visuo-spatial system is responsible for how we see the world in three dimensions and how we recall the details of what we observe.

In drawing, depth perception and visual motor integration (co-ordinating visual stimulus with physical actions) are crucial. In our workshops students remarked on the difficulties they were having with depth perception; “I’ve made it look so flat that I can’t distinguish what is what anymore.” “I’m finding it very hard to draw the hand and the arm because there is a certain amount of perspective going on which makes the arm look shorter in 2 D but in 3 D it’s not shorter, so to my eyes it makes sense but to my hand it doesn’t make sense.

An art tutor working in a secondary school remarked; “I find how some dyslexic students invert shapes whilst drawing fascinating.”

Another student voiced her frustration with what she saw as a deficit in her visual motor integration processing. “I’m thinking how frustrating it is to see something so accurately and not be able to translate it with the hand.”

Tchalenko’s (2001, pp.35-40) research also discovered that Ocean’s eye-hand co-ordination patterns were more temporally consistent than those of novice artists. We have found, getting students to air draw, (this needs to be done with a straight arm,) a number of times before they make any marks on the paper followed by looking through a piece of Perspex or glass and literally tracing the image onto it, repeating the process several times, then shutting their eyes whilst continuing to make the movements can help in two ways. Firstly, they build up confidence in their eye-hand co-ordination without fear of any evidence ‘being found to be wrong’ and secondly, they bring their motor memory into play, which may go some way towards remediating the automaticity deficit, which we will return to. At the end of a workshop one student remarked; “I feel I now have better co-ordination between looking and drawing”

A secondary school art teacher who wrote "…the main difficulty with my role is that many students have an aversion to drawing…", devised a similarly effective project where she reduced the students’ stress by; “…projecting an object or person onto a screen and getting the students to draw around it, we ended up drawing animals by torchlight which was magical."

The central executive enables us to pay attention to certain aspects and prioritise select and define one element and filter out others. It is responsible for decisions, for example, it enables us to discriminate one object from a busy background, the shape of an object as opposed to the pattern on the surface, it enables choices to be made about whether to focus on structure, or tone, or how much pressure to put on the pencil. “Drawing involves continuous selective decision-making over time …that requires concentration and interactive decision-making.” (Anderson, 2017, p.18)

Students’ remarks illustrated the frustration they were experiencing;

“I got distracted by all the surface detail.” “I’m trying to find out where things begin and things end and the relationship between the lines that intersect these spaces and I’m getting very tired and very confused.”

It is interesting to compare this visual confusion with the confusion students often seem to experience when planning a piece of writing, where making decisions about what to include and what to leave out can be critical. In the context of writing, we have found that getting students to move a frame over a mind map can help in two ways. Firstly, it can allow them to see what the planning options are and secondly by physically comparing their options, the decision-making process seems less stressful. Applying this strategy in the drawing workshops can be similarly helpful. Cartridge paper frames (21 x 30 centimetres,) are provided which students secure to their piece of transparent acrylic (3 millimetres x 43 x 73 centimetres,) during the ‘task without achievement,’ stage, (looking). They are then given an additional frame to secure onto their drawing paper to keep the task and achievement stage as similar as possible.

*Dyslexia and Stress* edited by Tim Miles and Ved Varma (1995) presents a comprehensive view of the stress many dyslexic people experience. We know that stress can impair, even shut down the functioning of the central executive. In his paper, *Stress selectively destroys declarative learning in dyslexic students,* Rod Nicolson ( In Abdulaal, 2016, p. 76) stated, “…math anxiety leads to affective responses similar to fear conditioning”. His research revealed that when a dyslexic group were given a declarative task (picture recall), “…the dyslexic group performed significantly better than the controls under no stress but were much more adversely affected by stress.” In a BBC Radio 4 interview a student described how the stress she feels when picking up a pen or pencil is the same whether she is about to start writing or drawing. (Ledgard, 2015):

I think things like using a pencil or a pen I don’t feel very in control of, if I’m writing something on paper I might write a sentence and then cross it out, and then try and write another sentence and then I can’t read my writing and it's the same with drawing. I might draw a circle and it’s wrong and there’s this immediate sense of failure which I think probably stems from quite an early age.

In addition to the strategies already described, we have found offering an explanation of the effect of stress, often referred to as the amygdala hijack, can be helpful. By understanding what is happening inside their brains students can consciously relax and take control. Furthermore, we have found that offering a selection of alternative ways of creating a form on paper such as collage, flexible wire, and insulation tape can also remove or at least lessen the anxiety attached to the pencil or pen. Finally, the benefit of working in an intimate group within the supportive non-judgmental atmosphere created by the drawing tutor should not to be underestimated.

***Automaticity***

In the book *Visual Literacy* edited by James Elkins, Barbara Maria Stafford states;“Vision… is a dynamic process in which the brain, largely automatically, filters,discards, and selects information and compares it to an individual’s stored record.” (Stafford, in Elkins, 2007, p.32)

Applying Fawcett and Nicolson’s theory of automatization deficit (Nicolson & Fawcett, in Fawcett 2001, pp.146) to the drawing process, one can appreciate how difficult maintaining material in the working memory whilst trying to draw might be for individuals with dyslexia. In *The Dyslexia Advantage,* Brock and Fernette Eide (2011)describe how there is a tendency to shift from right-to-left hemisphere processing as skill increases, they suggest that the dyslexic failure to make such shifts might reflect a kind of general difficulty in acquiring expertise through practice because of prolonged dependence on the novice right-sided circuits.

As we become more familiar with the purpose and demands of a task, our need for big-picture processing gives way to a demand for greater accuracy, efficiency and speed, and automaticity. That’s where the left hemisphere comes in, with its greater ability to process the fine details that must be mastered to develop true expertise.

This tendency to shift from right- to left-hemisphere processing as a skill increases is intriguing because it suggests that the dyslexic failure to make such shifts might reflect a kind of general difficulty in acquiring expertise through practice. (Eide and Eide 2011, p.34).

Could this reliance on the right hemisphere, ‘novice’ right-sided circuits, provide an explanation as to why is it, that for some trained artists the complex motor actions required when drawing from observation, do not become automated motor routines? In addition, these right-sided circuits are the very ones we use when we engage with wholist or big-picture thinking, as opposed to focusing on the fine details where the expert left-sided circuits take over.

***Wholist thinkers***

In a BBC Radio 4 interview John Stein observed that; “Two D drawing requires the ability to go from A to B to C, linear thinking whereas in fact they, [dyslexics] have seen the 3D structure in its entirety and It’s very difficult then for them to go

into this linear way off putting it down on paper”. He went on to say;“The dyslexic brain doesn’t operate in a linear boring fashion, it tends to be holistic,it sees the whole picture so that means many creatives are dyslexic because theycan see the whole picture.” (Ledgard, 2015,).

Ocean described his thinking whilst drawing the face; “That next rhomboid is the side of the nose-or it is an abstract shape. Each bit of the picture has to be able to exist in its own right.” (Tchalenko, 2001, p 38.)

The role of procedural memory has been highlighted in Aaron Kozbelt and William Seeley’s paper, *Integrating art historical, psychological and neuroscientific explanations of artists' advantage in drawing and perception,* in which they suggest that procedural knowledge impacts upon incoming visual information, helping the artist to effectively deconstruct visual scenes.(Kozbelt and Seeley, 2007,p.80-90).

Mortimore (2008, p. 118) observes: “strategies to help wholists will include…scaffolding frames to support the oral or written expression of information.”

An art tutor at a secondary school similarly remarked; “I have found asking students to methodically look at what they have been asked to draw and break their subject matter down into simple shapes has been a helpful strategy.”

These insights, when applied to the teaching of drawing, combine to suggest that deconstructing the scene and providing explicit instructions, both about looking and drawing, could be helpful to individuals struggling with controlling accuracy. Such a set of instructions has been incorporated in an eight-step procedure, tested in drawing workshops held at the Royal College of Art in 2012, 2015 and 2016;

1 To focus attention upon the subject-matter and its relationship with the surroundings (*figure/field* relations); relationships of *format* (portrait, landscape or square), and *scale*, (related to the choice of drawing medium, since medium dictates scale); and positioning of the drawing within the picture-plane (the drawing sheet itself) relevant to the *main axes* of the drawing sheet: the central vertical axis, the central horizontal axis, and the two diagonal axes.

2 To construct a general structure, or *scaffolding*: in terms of life-drawing, this would relate to the main axes of the model’s pose, using, for example, the ‘*N-grid’* of lines running across the figure that connect salient points such as nose, nipples, navel, (k)nees, and (k)nuckles. These axes might be the vehicle by which students hone their skills of accuracy in drawing angles and lengths in proportion so that the repetitive, low-level exercise is perceived to have contextual meaning for the student.

3 To understand and apply concepts such as *contrast boundary* in place of the common term ‘outline’. This immediately engages the student with the variety of tonal and textural values across the whole subject-matter and, in particular, allows the student to notice how the contrast boundary fluctuates at the edges between figure and field. The concept of *negative space* (spaces between those items in the visual field normally labelled with language), can also aid students to look without language, to apply specifically non-verbal methods in the process of drawing. Thirdly, to pay attention to the visual vertices, simply described as *T and Y junctions* apparent as edges where two surfaces are occluded by a third.

4 To repeat these first three steps at the beginning of every new drawing. The tutor might demonstrate the steps at this point.

5 To discuss with the tutor the process under way on the drawing board.

6 To repeat the recommended strategies with support from the tutor.

7 To draw independently at unsupervised open-access drawing sessions.

8 To reflect upon and critically assess the practices and strategies in order to reinforce them. This procedure takes the form of a group pin-up crit session with guidance from the facilitators.

This procedure is derived from an understanding of drawing as a visual equivalent of

language, in the sense that it is a conventional code, through which meanings are made *via* the selection and combination of visual elements (Table 1)

Humans are unique in using sounds, gestures and marks to stand for the things and events perceived through the senses. Something that stands for something else is a *sign,* and when the rules of syntax governing the paradigmatic selection and the syntagmatic combination of appropriate signs are agreed within a particular community, then such a shared system of negotiating meanings and influencing behaviours becomes a *conventional code*, a language.



**Table 1** Selection and combination of visual elements: Conventions of syntax and grammar apply to visual language.

Once the student is able to control the scale and positioning of the drawing using the scaffolding of the major axes relative to the scale and format of the drawing paper, confidence is established to elaborate on the next stages of drawing construction. The metaphor of ‘scaffolding’ resonates with Mortimore’s (2003:118) observations about dyslexic student’s’ tendencies to be wholist thinkers, who often have trouble organising details in order to support an overall argument in written form:

“…strategies to help wholists will include…scaffolding frames to support the oral or written expression of information.”

**Conclusion**

We have been thinking about how to enhance accuracy and how best to automatise the component subskills while teaching the skill of drawing as a whole, to individuals who for whatever reasons have not managed to acquire these strategies. We have done this because we strongly believe that the activity of drawing to record and explain what we are looking at is key to our acquisition of knowledge, particularly for individuals with poor working memories. In our workshops, we have seen that there are behaviors which encourage accurate drawing such as learning to trust visual memory, and it was gratifying to see huge improvements in both the quality of the drawings and the confidence of the participants. Our conclusion however inevitably reveals some questions for further examination;

What implications might top-down influences of abstract knowledge, such as rules of perspective, have on laterality? In other words, what knowledge is essential for the activation of expert left-sided circuits and automaticity in the drawing process?

Do drawings have a role to play in evaluating whether the strategies presented here could be a helpful addition to a dyslexic student’s ‘individual support plans’?

In order for drawing to be seen as a process for understanding and representing our world and as a tool for remembering knowledge, what is the best way of raising awareness in schools of the benefit of teaching drawing to learners - particularly visual learners - in a wider class room context, rather than confining it to the art room? Towards this end, an exploration of the role of drawing as a way of knowing, in the context of school biology classes will be continued through the ongoing AHRC funded project, *Representing `Biology’ as Process* (2017-20) in collaboration with Exeter University.

We will end with a quote from Anderson (2017, p.20); “Viewing a drawing is a way of recalling ‘a story’ that activates the connection between memory and embodied experience as opposed to recalling an instantaneous picture.”

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