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## **When is the disability of autism a visual processing disorder?**

The current diagnosis of autism is not fit for purpose. The reliance on diagnosis based on the triad of impairments is inappropriate as it does not give any indication of the causes of the problems that are encountered. Two individuals with precisely the same diagnosis may have completely different conditions and similarly two people with the same condition may be given differing diagnoses. This makes all research unreliable and interventions cannot be deduced from the diagnosis.

In our specialist optical practice we have to start from the beginning with every person with an autism diagnosis (or those who are undertaking the outrageously long diagnostic procedure) as the diagnosis is not relevant from a visual processing point of view. This is compounded by the fact that some of the most disturbing symptoms in ASD are complex anomalous visual problems. Vision in ASD is often very different to that experienced by the general population and probably causes many of the “triad of impairments”. If this is the case, then the triad of impairments is a consequence of, rather than the condition of, autism and visual processing anomalies are one of the types of autism. This is a paradigm shift – yet I believe that there is no alternative that is satisfactory.

The visual problems experienced by those on the spectrum vary significantly, ranging from obvious visual problems to some visually evoked problems that appear to have no relationship with vision, such as the McGurk effect in which words in speech appear to change due to the desynchrony (mistiming) of vision and hearing. They cause misery and affect lives to a great extent, yet they are rarely addressed and I believe this to be an unacceptable state of affairs.

Visual processing problems are not addressed in a standard eye examination, nor will refractive interventions be of significant help in autism except that, for some of the hypersensitive visual problems that can be found in ASD, it is essential that spectacle prescriptions that are low in power are prescribed as they have effects out of proportion to their apparent power. Visual planes can be very precise in ASD.

Primary visual processing problems cause a range of difficulties to the person on the spectrum. Often the most disturbing is the range of facial recognition or expression recognition anomalies that are so common. These range from disappearance of the face, through pain on facial viewing, to distortion and metamorphosis. They can be truly terrifying to some children. Some of the faces may change to those of monsters or animals. Scanning of the face may be the only way in which expression recognition can be determined as the attentional field may be small. Yet these are easily treated in the vast majority of cases. Symptoms will immediately resolve with the correct filter in virtually all cases (and an optometrist should be able to prescribe a tint to do this and work out what to do when the lighting is modified – they may however need specialist instrumentation to tune the visual stimulus to the optimum level and work out what will happen in differing lighting). It is a tragedy that it is so rarely addressed.

A second important area of visual processing in ASD that should be addressed is that of visual timing anomalies. The basic principle was discovered in 1922 when Carl Pulfrich found that when he placed a tint over one eye a pendulum would appear to alter its course. This effect showed that the tint changes the processing speed of the visual signal to the brain. The timing of the visual input could be modified by placing a filter over an eye with resultant special awareness. This is absolutely crucial in both sensory integration and synaesthesia. It is critical to realise that not only can lateral timing be effected in conditions such as mixed dominance / cross laterality but timings of all sensory systems can potentially be modified using visual timing. Cross-lateral problems reset using control techniques based on the Pulfrich effect. This means that if the body is out of time with the vision it is possible to tune it until synchronicity is achieved. The effect of this can be massive, with hearing becoming clearer as the McGurk (speech changes as the lip synch is modified) effect is negated. Visuospatial awareness becomes much better, movement control can be dramatically different and visual feedback is synchronised. The world becomes much more stable and predictable for those on the spectrum.

A third area of visual processing which should be addressed in ASD is reflected in the effects visual processing has on body mapping. Body awareness can change significantly, from knowledge of where the body is to how hot or cold it is, from pressure and pain awareness to changes in taste and texture of food and clothes. Haircuts can become acceptable rather than painful if the vision is tuned correctly. This has inevitable effects on quality of life.

Another area of visual processing is that of visual stability. It is perhaps most apparent during reading when the text reverses, inverts, crowds together, displaces and even disappears. Dyslexia is often the consequence of visual processing disorders yet they are not routinely addressed when a child has difficulties. It is bizarre that it is not standard procedure in an eye examination to correct these visual problems.

Another common problem in ASD is synaesthesia which often has a visual processing component. This is where one sensory system is processed in full or in part as a different sensory system; for example: some people on the spectrum smell in colour. It is

extremely complex and not well understood. But, when visual input causes another sensory system to respond, it is critical that this is accepted and the visual input addressed. Conversely, vision may be directly affected by other sensory inputs, in this case the cause of the problem not the consequence needs to be addressed. These are rarely addressed in practice.

In addition standard visual problems such as eye movement are influenced and, in some cases caused by, visual inputs and it can be that standard optometric and ophthalmological interventions are less effective than processing modifications. This is an extremely controversial area but the evidence appears to be conclusive in some cases. There is much to be done.

So what can be done to modify visual processing in ASD? There are a number of options. The obvious one is exercises. These appear to have little effect in most cases but may be of use in rare cases. The second option is using prisms. These may have some use but cannot address most of the problems associated with visual processing difficulties. Lighting modification may be used, but by far the best method is using specialist filters.

We prescribe them using the following techniques. We establish the optimum gamut (envelope) in colours space (the standard method of specifying colour accurately). Sometimes we have to assess both eyes individually to tune them to system synchronicity. We factor in task, lighting and tolerances and predict from a complex mathematical procedure the optimum lens filter that will tune out timing, mapping and other difficulties. We then compare optimum performance against both standard lighting and demonstrate the potential difficulties that may be caused by inappropriate stimuli. The effects will be obvious to the patient, the parent and the clinician. Prescription of the tint and refractive error will be combined as this may vary with stimulus.

The effects vary between small and life changing. The majority on the spectrum have major processing problems and it would appear to me that visual processing interventions cause the most significant changes that can be seen in ASD. This means that all children and adults should be assessed routinely – and it is essential that optical professionals have sufficient training to be able to address these common visual problems. However this will not happen unless it is a financially viable proposition or a legal obligation. My own feeling is that it should be both. Currently it is neither, with the consequence that those on the spectrum are rarely given adequate visual processing interventions, and this causes them major problems in their lives. This needs to change.

Unfortunately there are only a few optical practices or hospitals in the UK with instrumentation which can tune the sensory systems. However I would consider it an essential assessment for everyone on the spectrum, as you cannot predict the degree of improvement possible unless you try. You may have to pay privately for an assessment (we include it as a no charge extra to the NHS eye test – which is available to all children and most adults providing they are UK citizens.)

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There is little research into vision and ASD – and what there is is limited. To find out more you are welcome to download one of my books from my website *The circle of underachievement* – it's a little out of date and does not exclusively deal with ASD.

Alternatively, my latest book: *A Parents Guide to Vision In Autistic Spectrum Disorders*, ISBN: 978-1-326-14423-4