

Irlen Scotopic Sensitivity : The Link to Autism.

Abstract:

This study demonstrates a link between Scotopic sensitivity (Irlen) syndrome (IS) and autism. A behaviour observation study of a twelve year old was combined with the diary of an adult, both have Asperger's Syndrome, before and after the application of Irlen filters. Four prominent psychological theories have been discussed in relation to IS. Alternative explanations are offered for obsessive, rhythmic and self abusive behaviours, also for fantasy/ reality distinction and empathy.

What is Irlen Syndrome?

Lewine (2000 in press) refers to IS as Neurobiological information processing handicap. It is a Visual perceptual processing deficit caused by sensitivity to certain frequencies of light. This sensitivity affects the timing by which the brain receives and processes visual information. The constant struggle to refocus and adapt to light sensitivity can cause migraine, learning difficulties, attention deficit disorder, behavioural problems and low self esteem. IS affects around 20% of population - resulting in under achievement at school and work (Irlen 1991) and is said to underlie the sensory overload experienced in autism.

Physical effects of IS include photophobia, nausea, eyestrain, headaches, migraine, photosensitive epilepsy, stress and chronic fatigue. Individuals report visual distortions of the printed page caused by high contrast, particularly under high luminance conditions. These are usually problems of glare, competition, pulsation, flickering and flashing of the background. The perceptual system becomes confused by competing stimuli. (**Lewine in press**) has discovered an abnormal pattern of information processing in which stationary stimuli caused abnormal activation of the brain regions responsible for the processing of visual motion. Although Irlen's work was predominantly within the domains of reading disability it is now known that reading difficulties occur as a consequence of a perturbed perceptual world. Individuals are generally unaware of their visual difficulties. They need to put an enormous amount of concentration into achieving the smallest amount of academic success. Tiredness ensues after reading or writing a few lines. Writing and verbal communication is generally reproduced as seen.

Sensory Difficulties

The Geneva centre for autism (1999) found 81% of their clientele reported these visual distortions of their whole environment (Irlen 1994). The effects of IS also impair concentration, depth perception, co-ordination, balance. There is often a reliance on peripheral vision, tunnel vision, hypersensitivity to light, stereotypic activity near the eyes. All of which are seen in autism. As over

67% of sensory information received to the brain is visual, the stress of IS creates hypersensitivity and lack of integration of the other senses as they attempt to compensate.

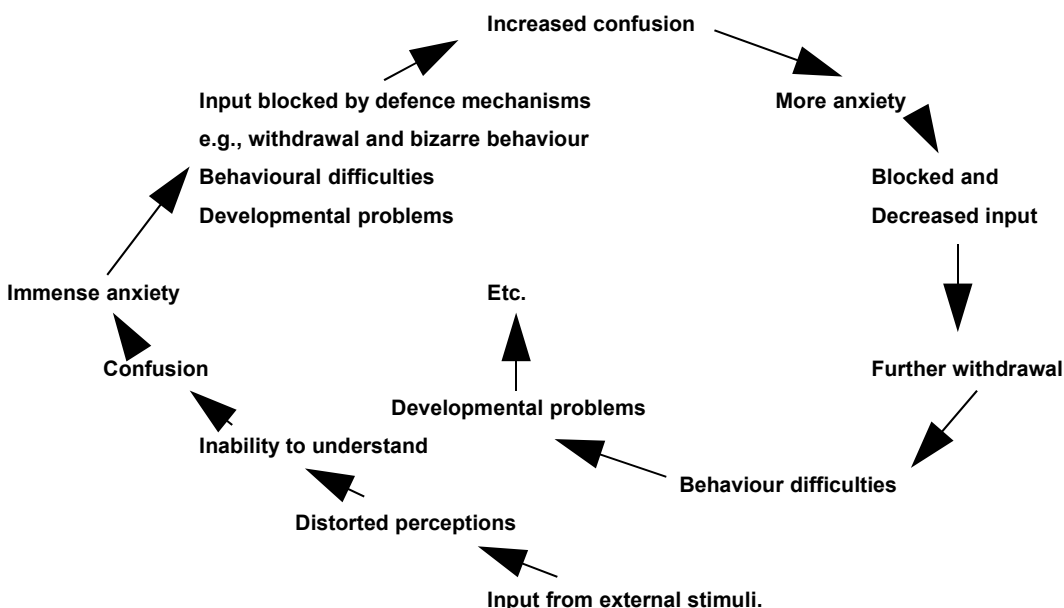
Donna Williams (1993) reports

I had always know that the world was fragmented. My mother was a smell and a texture, my father a tone, and my older brother was something which moved about. Nothing was whole except the colours and sparkles in the air. The lack of integration of my senses became the lack of integration of my emotions with my body and my mind.

The phenomena of misperception and sensory overload in autism is well documented (Hale 1996, Whelan 1996, Blackburn 1999). The touch, taste, smell and hearing of individuals with over aroused nervous systems provides graphic details of difficulties encountered. Sadly they are still overlooked (Grandin 1996).

Bettleheim (1969) identified ritualistic behaviour as a stress response developed by the child in order to provide protection from early traumatic experience. Timbergen (1983) supported this view suggesting the individuals' withdrawal was caused by anxiety. Terms like refrigerator mother and maternal deprivation may have discredited his claims. Bettleheim may in fact have been observing Irlen (tactile defensive) mothers with children on the spectrum.

Carlton has extended these views into this model.



Reprinted from Carlton (1993) p87.

Individuals become trapped in a spiral where the distorted perceptions and the stress feed each other. Blocked perceptual stimulus leads to starvation of the very stimuli needed to learn. Further reinforcing the child's confusion.

LINKS WITH PSYCHOLOGICAL THEORY:

Theory of Mind:

Baron-Cohen (1995, 1997) states that individuals with autism have an impaired T.O.M. - more specifically they fail to develop neurocognitive mechanisms which allow mindreading. Mindreading enables individuals to make sense of actions, interpret gaze as meaningful and to decode "language of the eyes". Baron-Cohen makes many references to the similarities in behaviours of blind and those with autism. He also discusses the psychophysics of the eye direction detector, which he states detects the strong contrast between the white of the sclera and the dark of the iris and pupil. Immense difficulty with visual contrast is the hallmark of IS, making eye contact very painful. One cannot decode visual communication if one cannot see it in the first instance. Nor can one integrate the non verbal communication with the auditory expression of the opponent communicator.

Leslie's (1987) Metarepresentational deficit

Highlights a cognitive deficit in the ability to symbolise. The second hallmark of IS is the inability to see the whole picture. Individuals report a very narrow range of focus. These may be the individuals who see a penny on a brown rug and yet fall over the coffee table. Donna Williams's (1996a) reports seeing ears, mouths, shiny earrings or noses rather than the whole face. DJ and MJ report the same.

Linking IS to Leslie's theory - One cannot build a mental representation without a visual representation as a starting point. Interestingly, Jordan and Powell (1991) demonstrated an understanding of metarepresentation in the form of photographs. Photographs require a narrower field of visual focus in order to process the whole picture. Although it may still be possible that the individual needs a high degree of concentration to process photographs, the amount of saccading the eyes have to perform in order to collect all the visual data is much less. This may also explain why high functioning individuals such as Grandin (1996) report learning social behaviour from Television and video.

Hobson's Social - affective dysfunction (1989, 1993).

Begins with the early dyadic relationship. The child directly perceives the emotions of the mother via her facial expression. It may be that the child with autism / IS may be able to process and perceive concrete emotions such as happy and sad due to the construction of motherese, perhaps with the ability to see only the mouth or eye. As emotions, facial expression and body

language becomes more complex, the child's perceptual system may be incapable of processing the complete picture. The child's narrow visual field may prevent him having a complete picture of his own body. Development towards intersubjectivity may therefore be prevented. This would support Hobson's shift in emphasis from a cognitive antecedent to a primary deficit in the ability to directly perceive the emotions of others.

Central Coherence Theory:

Originating from gestalt psychology, this theory appears to describe IS. Frith suggests that information processing is disturbed, that individuals with autism are extremely good at narrowly focused and detailed processing at the expense of global processing. They retain isolated factual content at the expense of contextual meaning. Happe (1999) discusses the work of Hobson, Ouston and Lee who looked at local processing of faces, in particular the eyes. She also discusses Frith's studies on block design tests - In particular that autistic people are better on block design tasks because their local processing preference prevents them succumbing to gestalt law. Happe also discusses savant skills in relation to this affinity for local processing. Suggesting that artists draw from one contiguous detail to the next. Relate that to an excerpt from MJ's diary which reads

" Today I had a bash at drawing. This is something I have been putting off as its so important to me. I find I can now draw both sides of things. Before in my art (which is mainly fantasy stuff) I always drew from my imagination as drawing form life was hard. I'd construct my subjects in pieces and then assemble them with tracings. If the subject was symmetrical I would construct one side (usually the left) and then trace and reverse it".

Executive functioning deficit (Ozonoff 1995).

Using carlton's model one may argue that stress is a major factor in the degree of visual disturbance. From personal observation visual disturbances of this nature are reported by many individuals with stress related illness - in particular migraine, photosensitive epilepsy, and depression. Individuals who sustain systemic shock due to surgical bleeding also report cloudy, disjointed vision prior to collapse. Relating this to Carlton's model visual disturbance may reach a point where the individual sees little other than cloudy images which shiver madly. The individual may become disorientated and executive functioning is lost.

Observations of DJ and MJ before and after application of Irlen filters:

.Table 1 DJ.

Observations before tinted lenses.	Observations with Irlen lenses.
<p>Anxiety and emotional volatility / perceived aggression evident in school reports.</p> <p>At home markedly different behaviour, occasional “pushing of boundaries” / grumpiness” in line with chronological age.</p> <p>Extreme emotional sensitivity to negative comments resulting in tears. No aggression or violence in the home.</p> <p>Tendency to self - remove when upset.</p>	<p>Immediate effect.</p> <p>At the time they were first used DJ was becoming very agitated, complaining of visual disturbance and headache, having been unavoidably placed under fluorescent light.</p> <p>Immediate calmness as soon as spectacles are worn.</p> <p>Obvious expressions of happiness i.e., singing, continual thanking for new “vision” .</p> <p>Reading and absorbing unfamiliar material.</p>
<p>Stance very rigid and “bull like” this increased markedly under stress i.e., confrontation, social situations, swimming pools.</p>	<p>More relaxed stance generally.</p>
<p>Immense difficulty “seeing the whole” picture. Could see the author’s whole face at a distance of 60-67.5 cm. At less than 60cm he reports seeing “picasso” style, a prominent eye or nose and the rest disjointed. Distance vision was whole but disturbed by glare and blurring, with visual field of 17” (45cm). Eyes “flit all over” to take in a whole scene.</p>	<p>DJ’s first words were “your face is beautiful mum”.</p> <p>This was followed by DJ picking up a book and reading unfamiliar text out loud with enthusiasm.</p> <p>Visual field of focus immediately opened up to 12’6” (375cm).</p>
<p>Travelling by car or public transport DJ never looked out of the window.</p> <p>Always “focused” on his lap top or electronics magazines for the journey.</p> <p>Travel sickness without an object of focus.</p> <p>Refused to go out.</p> <p>Needs the car radio loud to drown out “white noise”.</p>	<p>No further reports of motion sickness.</p> <p>DJ was able to communicate well, particularly about this new “sight”.</p> <p>Looking out of the window enjoying the scenery.</p>
<p>Giddy loud and boisterous in social situations involving more than four people. Interacts for ten minutes at a time and removes self unless “excited” by the attention (i.e. stimulating conversation with adults).</p> <p>Clung to carer at all times outside and in unfamiliar surroundings and on stairs - lots of “touching” .</p> <p>History of class disruption. Has always needed one hour of “complete quiet” after school to calm down.</p>	<p>Still apprehensive about going into social situations, although once there he relaxes. Much more comfortable with people generally. No more “grounding” behaviour.</p>
<p>Bumped into everything, continually tripped, missed pavement edges and stairs, dropped cups whilst putting them down (either missing the surface or banging them down). Major physical co-ordination difficulties.</p>	<p>Co-ordination very much improved. DJ reported that he felt he was “walking on air”</p>

table 1 cont'd.

History of "hitting out" at others. Particularly in the playground and cloakroom. Resistant to behaviour modification.	Still affected by the noise in the cloakroom, but no further "hitting".
Constant complaints of over sensitive sensory system i.e. Loud noises, painful touch, scratchy fabrics, poor temperature control, visual problems, smells (perfume, fabric conditioner), daydreaming. Carbohydrate eater.	Visual problems eradicated. Some sounds still painful but "white noise" much less. Needs time for sensory system to "calm down" although smells and fabrics tolerated much better. Trying stronger tasting foods.

Table 2 MJ.

Extreme stress.	Effect of Irlen lenses is immediate and dramatic. Marked reduction in stress.
Visually - print moves about, can only visualise one letter at a time. Worse over times. Unable to see whole faces as picture breaks up. Very flat 2D vision.	All print stable, can read continuously with little effort. Aware for the first time how "picaso like" vision is.
Difficulty with speed and distance. Other traffic "jumps" out from junctions. Poor balance and co-ordination.	Driving much less stressful. Traffic glides along for the first time. Enjoyable rather than a chore.
Motion sickness when not driving.	Complete eradication of motion sickness.
Social situations unbearable. Cannot make sense of environmental movement. Bothered by noise. Jumpy. View of the world painfully intolerable.	Less stressed in busy situations. Much more confident. Now aware of previous "blocking out" / daydreaming to reduce visual overload. Describes lenses as "Unplugging her head from the mains".

Discussion:

DJ has been assessed as very high functioning - Verbal IQ 140, performance I.Q 110. His coding subtest score of 06 significantly reduced his overall performance. He had a reading age of 17 at age nine. However, despite high ability DJ has been unable to continually access mainstream curriculum, resulting in refusal to work and challenging behaviour (violence towards others). He has a long history of behaviours typical of autistic spectrum disorders (Meherali 1998). He flinches in relation to sudden movement or unexpected noise. He has never been able to tolerate the noise of hand dryers, fans, drills or babies crying. He often plays his personal stereo loud to drown out "white noise" and often appears to be deaf. His behaviour and self reports are reciprocated in MJ's personal reports. Prior to the application of Irlen filters DJ's communication had deteriorated to one word answers and electronic jargon. His ritualistic behaviours (head banging, self injury, rocking) were at their worst. He had developed stress related ailments such as asthma, and skin problems such as psoriasis, athletes foot, excema and frequent mouth ulcers, which are all indicative of a stressed auto-immune system. Observation of DJ's behaviour under fluorescent light (table 1) highlighted immediately why he found school intolerable.

DJ had no awareness of his visual impairment prior to application of Irlen filters. DJ has never coped with social situations, supermarkets, churches or swimming pools as they all create environmental sensory overload. Although he has always had sensory problems his behaviour deteriorated markedly at the end of primary placement, which was when he first needed spectacles. During the last two years DJ has attended many opticians because he stated that the spectacles made his vision worse although he couldn't say why other than his vision was blurred. He now describes it as halo'd but with as many as five images. Rather like ghosting on a poorly tuned TELEVISION, without his filters. This may mean that DJ "hits out" to stop the movement of others in order to orientate himself with the "real" image. Interestingly, MJ also reports an awareness of visual perceptual difficulties at the same age. This could account for the reason some pupils with autism are understood to fail at secondary level.

According to Morris (1999) stress stimulates the sympathetic nervous system . The pupils dilate to let in more light and the acoustic nerves are stimulated to give more acute hearing. Continuous stress results in increased brain endorphins (causing aches, pains and exhaustion), abnormal thyroid activity (poor temperature regulation), physical skin discomfort (crawling), increased white cell activity (destruction of normal cells) and lactic acid build up (muscle pain). All of which are seen in DJ. It is expected that DJ's nervous system will take time to return to baseline as he has endured prolonged sensory overload

DJ has spent his life avoiding light, sitting inside cupboards, behind settees, under tables and closing curtains prior to application of his Irlen filters. This was his own compensatory mechanism for enabling better visual processing.

Explanations for DJ's behaviours:

Obsessions:

DJ has always been interested in electronics. Electronics follows a logical and therefore predictable sequence with a scientific approach, which would be appealing to this type of child (Baron-Cohen et al 1997). Even though he could not see properly he could possibly make out the shapes of words in the reading material making it easier to follow than unpredictable material (i.e. Stories). His high ability in the subject along with other's lack of knowledge meant that perhaps his ability would never come into question. This is perhaps the only area he feels confident with. His friends are often in awe of this ability and he is often noticed "over inflating" his skills (Meherali 1998), which is indicative of his lack of self esteem. However, he is still apt to complete an electronics project which then fails to work because he has missed a vital piece of procedural information. This may account for his patchy learning in general.

Rhythmic behaviours:

DJ has always displayed rhythmic behaviours. Under stress (both positive and negative) he rocks both on his bottom and on his feet whilst standing. He also runs around the coffee table arm flapping, and has been noted to be very confused at this time. It is possible that DJ may be using these behaviours to restore executive functioning. To test this DJ was asked to play a timed (ten minute) strategy game at the onset of rhythmic behaviour, which achieved a much quicker result. Donna Williams (1992) reports rocking as bringing order to her world, which suggests that it may also be used as a focus of concentration to block out painful sensory bombardment. Both DJ and MJ verify this.

Self abuse:

Biting and head banging have been a common occurrence for DJ since birth. He now reports head banging as communication to an adult "My head is exploding", he is notorious for facial grimacing, screwing his eyes up and scowling which are attempts to cut down light intensity. He often nips himself under pressure which he reports as stopping his skin crawling. Although DJ's rhythmic and self abusive behaviours reduced with age they were still evident under stress, particularly in situations which would promote sensory overload. Since application of Irlen filters a marked change has been noted both in the length of time indulged in such activities and the frequency of occurrence.

Fantasy / Reality Distinction:

Some high functioning individuals with autism are said to have difficulty with fantasy and reality (Lancome 1998). The author would like to offer an alternative to that view with IS in mind, using personal anecdotes to demonstrate reasoning. When DJ was five he caused an uproar in the staff room of his school when he wrote a story. During the course of the story he wrote

"On Wednesdays dad baths us and dries us with a blow lamp".

If this sentence is viewed in the context of Leslie's metarepresentational theory the following applies. Without a visual representation there is no mental representation as already stated. Without a mental representation one cannot build a concept of "is like". Lack of a concept then means it cannot be communicated appropriately. It is possible that DJ's tactile experience of being dried by his dad was a burning sensation in line with sensory hypersensitivity. He would not have the "is like" concept to communicate this.

As DJ has matured these sensory experiences have become more complex in the way they are communicated. To give an example he was becoming stressed following a misunderstanding in which an adult was trying to improve his perception. He immediately threw himself into the stairs

blaming the adult. Again relating this to Leslie's theory, perhaps DJ's aches and pains from sensory stress felt like being thrown down the stairs. It is possible he was communicating "You are making me feel like you have thrown me down the stairs" the best way he could.

Empathy:

Some individuals with autism are said to lack empathy, others are said to be over empathetic or their degree of empathy is inappropriate. The author would like to offer an alternative view, taken from a scene where both mother and son have Irlen syndrome.

"We inadvertently freaked the psychologist out today with the chinchilla. I assumed she liked animals because she asked about them as she arrived - I didn't pick up on her fear. I advised my son to introduce them as this usually gets the conversation going for him. However, he was getting one out of the cage when she said "Don't bring them near me". He didn't hear due to his concentration on the task. I heard her but her words took a minute or two to process as I was concentrating on my son, in case the animal jumped. The psychologist proceeded to shout about his lack of empathy. The whole thing happened too quickly for us to process. If only she knew how bad I feel".

Much of DJ's seen and heard information may be lost due to his sensory difficulties. He reports learning everything androgic style, usually by trial and error. It appears that he learns more from practically applying his skills and knowledge. This may explain his egocentric behaviour in practical group learning situations. It may also support the notion of individuals with autism not being able to apply their classroom learning to real life experiences. DJ is a very keen and able adolescent who always attains at least 85% in end of term module tests despite being continually unable to access curriculum. Despite difficulties with reading he continually has his head in books. Much of his autistic behaviour may in fact be his own compensatory mechanism, developed to aid his own learning within the stress of a sensory bombarding environment. This would again support Bettelheim's view. Williams (1998) supports Bettelheim in describing autism as an internal human normality with the volume turned up. DJ and MJ appear to be a highly sensing individuals. They are amazingly empathetic and animated towards individuals who are themselves of a calm, quiet and patient disposition. Perhaps these individuals are not a threat to their sensory systems and ultimately no threat to their emotions.

The author is not suggesting Irlen lenses are a cure for autism, because learning to date has occurred through faulty perception, some of which has to be re-learned. The suggestion is that Irlen lenses bring visual perception to normal. They reduce environmental sensory overload,

enabling valuable learning to take place. The suggestion is also that Irlen syndrome may be the primary deficit in autistic spectrum disorders, or that the 80% identified may in fact be Irlen sufferers. Irlen syndrome robs it's sufferers of the first basic point of reference to others which is so important for social and communication development,

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