

---

Sensory Perception in Autism:

*Experiencing the World the Autism Way*

---

Olga Bogdashina

---

The diagnosis of autism is based on behaviours

- Impairments in social interaction
- Impairments in communication
- Rigidity of thoughts and activities



---

“I am still perplexed by many people who do not acknowledge sensory issues and the pain and discomfort they can cause...  
Sensory issues are very real, and they are more a matter of degree than being either present or absent in people” *(Temple Grandin)*

---

---

# Spectral Character of Autism

Autism never manifests itself in the same way twice, as there are many types of it (*O'Neill*)

---

*The Triad of Impairments*

↑ ↑ ↑  
Lack of ToM,  
WCC, etc.

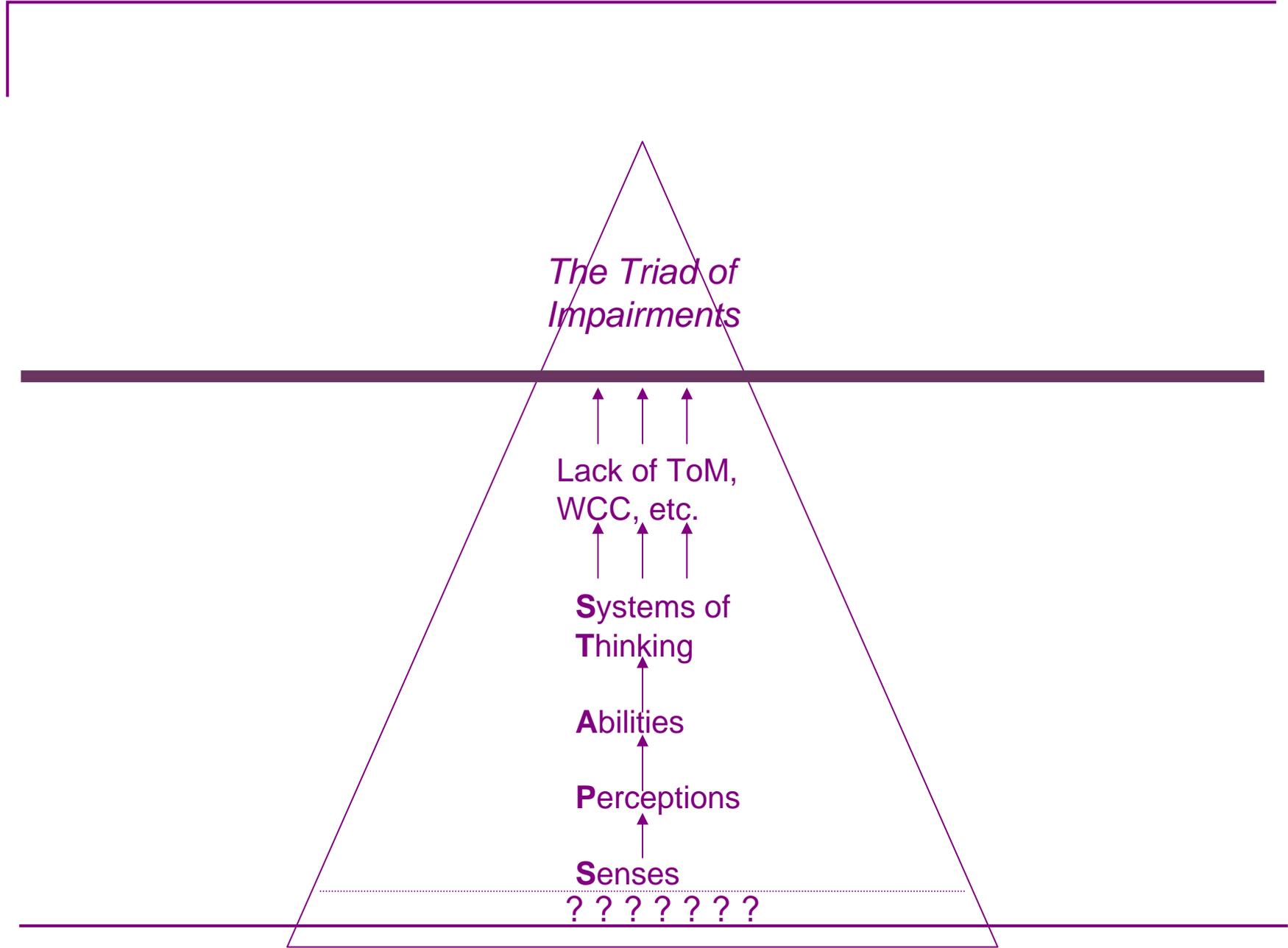
↑ ↑ ↑  
**Systems of  
Thinking**

↑  
**Abilities**

↑  
**Perceptions**

↑  
**Senses**

.....  
? ? ? ? ? ? ? ?



---

Sensory perceptual problems in autism  
are recognised now but...

They are often  
oversimplified -

**Hypersensitivities**

---

# Perception

---

Stimulus → Sensation → Interpretation  
→ Comprehension

- Vision
  - Hearing
  - Tactility
  - Olfaction
  - Gustation
  - Proprioception
  - Vestibular system
-

- 
- The real world and our mental image of the world differ
  - Information from the senses is influenced by the 'inside information'
  - With age we 'distort' what we perceive even more
  - Our interpretation of the world is based on our memory and experience
-

---

The problem for many autistic individuals is that they do not realize that their sensory perceptual processing is different.

A typical thought they might have is:

*“There is something wrong with me. I can’t do things right. Everyone is mad at me. No matter how hard I try, something goes wrong. Other people can do things I can’t. it must be my fault that I’m having so much trouble” (Spicer)*

---

---

Instructions are printed in red against a green background but you are colour-blind and cannot distinguish between red and green. Would you know what to do?

---

---

“As people began to explain how other people experienced my behaviour, I came to learn that all behaviour had two definitions: theirs and mine. These ‘helpful’ people were trying to help me to ‘overcome my ignorance’ yet they never tried to understand the way I saw the world.” *(Donna Williams)*

---

---

## Sensory dysfunction or different sensory experiences?

- Not all the differences in perception are dysfunctional and sensory differences are not necessarily problems/difficulties.
  - Some difficulties may be caused by environmental factors. If they are accommodated, this particular 'dysfunction' would disappear.
-

---

“Learning how each individual autistic person’s senses function is one crucial key to understanding that person” *(O’Neill)*

---

---

# Gestalt perception

- The inability to distinguish between foreground and background information
- Perception of the whole scene as a single entity with all the details perceived (but not processed!) simultaneously

*“It was like having a brain with no sieve...” (Donna Williams)*

---

Kanner (1943):

- ‘The inability to experience wholes without full attention to the constituent parts’:

*“a situation, a sentence is not regarded as complete if it is not made up of exactly the same elements that were present at the time the child was confronted with it.”*

---

---

Kanner (1943): The insistence on sameness:

“This insistence on sameness led several of the children to become greatly disturbed upon the sight of anything broken or incomplete.”

“Every... activity had to be completed from beginning to end in the manner in which it had been started originally. It was impossible to return from a walk without having covered the same ground as had been covered before.”

---

---

## Gestalt perception

- Every situation is unique:

*“Moments with their own uniqueness challenged me so much that I began to fear all those unknown paths, clothes, food, shoes, chairs and strange human voices. Each one challenged me by putting in front of me a new situation for me to face and understand” (Tito)*

- Any change destroys Gestalt and brings confusion and fear

---

---

Gestalt perception → Resistance to change/  
Insistence on sameness

*“I cannot tolerate any kind of [change]... If a chair or a table was out of place, I would immediately place it where it is supposed to be... It would distress me to find someone had picked up a magazine from the coffee table because I had arranged them in a certain way. So guests would be very surprised to find me taking the magazines from their hands and putting them back where I thought they should be.” (Tito)*

---

---

## Mental map (Tito, 2008)

“A mental map is a mental picture I form, which I expect to face in the process of events, so that I am not surprised or shocked by any sudden situation...

I have a mental map of how things should happen around me. When they do not take place as expected, the anxiety is no less than any physical pain. It produces an amplified sensation throughout my gut.”

---

---

“Every experience settled in my mind as... a natural phenomenon, which laid down the rules of the world. E.g., if I saw a bird on a tree, and, at that very moment, I saw someone across the street in front of our gate, I concluded that every time a bird sits on a tree, someone needs to walk across the street.

[If this didn't happen] I would panic and get so anxious that I would scream.” *(Tito)*

---

- 
- They make their own connections and create new Gestalts
  - Gestalt behaviours – rituals and routines
-

---

## Gestalt → lack of generalisation

“I would learn how to tackle a given situation in one context but be lost when confronted by the same situation in another context. Things just didn't translate. If I learned something while I was standing with a woman in a kitchen and it was summer and it was daytime, the lesson wouldn't be triggered in a similar situation if I was standing with a man in another room and it was winter and it was night-time. Things were stored but the compulsive overcategorisation of them was so refined that events had to be close to identical to be considered comparable” (Williams)

---

---

## Another ‘side-effect’:

- Gestalt perception makes autistic individuals vulnerable to sensory/ information overload:

*“Like computers overloaded with information and required to process too much at one time, we often ‘crash’. Some people shut down and ‘tune out’ completely” (Sainsbury)*

---

---

## What we can do to help (Gestalt perception):

- We should find out which modality does not filter information and make the environment 'visually/auditorily, etc. simple'. The next step would be to teach the person to 'break visual/ auditory, etc. picture' into meaningful units, i.e. teach them to recognise relevant features of objects and situations while ignoring irrelevant ones.
-

---

Ctd.

- Structure and routine make understanding of everyday activities easier and provide feeling of safety and trust.
  - Always communicate to the person beforehand, in a way he can understand (e.g., using verbal, visual or tactile means) what will be changed and why. Changes should be gradual, with his active participation.
-

- 
- Let them have a ‘safety object’ (a toy, a piece of string, etc.) when they go to unfamiliar places or face an unfamiliar situation
-

---

Another reason to “insist on sameness” – the inability/difficulty to ‘stop feeling the change’, leading, in turn, to overload and/or hypersensitivity

- Rubenstein, J.L.R. & Merzenich, M.M. (2003): *Increased ratio of excitation/inhibition in key neural systems*
- Casanova, M. (2002; 2005): *Minicolumns in autism*

---

Gestalt perception may result in different experiences, compensatory strategies and perceptual styles:

- **Fragmented perception**
  - **Distorted perception**
  - **Delayed processing**
  - **Hyper-/hyposensitivity**
  - **Mono-processing**
  - **Peripheral perception**
-

---

# Fragmented perception

“I had always known that the world was fragmented. My mother was a smell, my father was a tone, and my older brother was something which was moving about” *(Donna Williams)*

---

---

# Fragmented perception

“I had fragmented perception of things at the best of times, seeing eyes or a nose or whiskers or a mouth but mostly putting the bits together in my head”  
*(Williams)*

---

---

## Proprioceptive and tactile fragmentation

“My perception of a whole body was in bits. I was an arm or a leg or a nose. Sometimes one part would be very much there but the bit it was jointed to felt as wooden as a table leg and just as dead” (*Williams*)

---

---

“You may observe the autistic person rubbing sandpaper on his bare arm, or banging his knuckles sharply into a solid wooden dresser, then peering at them as if to say, ‘Oh, hello, hand. So you do belong to me, then’. Sometimes, the body feels fragmented, so it appears to be suspended or floating in pieces.” *(O’Neill)*

---

---

# Distorted perception

E.g., in the field of vision:

- Poor/distorted depth and space perception
  - Seeing 2D world
  - Double vision
  - Distortions of shape, size, movement, etc.
-

---

## Visual distortions

*“No one guessed that my eyes picked up different signals from the light, shade, colour and movement... I basically emphasised folds and depths... So I perceived people... as slightly distorted. This was not only in shape, but also in the composition of the components of their bodies in my visual imagination” (Blackman)*

---

---

## Auditory distortions:

*“A child with poor auditory perception may hear sound like a bad mobile phone connection, where the voices fades in and out or entire parts of the communication are missing.” (Temple Grandin)*

---

---

Other problems:

- **Bilateral integration problems** – when the person has difficulty coordinating the two sides of the body. They fail to develop side dominance.
  - **Prosopagnosia (Face-blindness)**
  - **Synaesthesia**
-

- 
- Face-blindness may co-occur with ASD
  - “Prosopagnosia may be an essential symptom in ASD, perhaps a specific group of Asperger syndrome” (Kracke)
-

---

## What we can do to help:

- If a person is prosopagnostic, introduce yourself each time you see him. Wearing the same clothes and hairstyle facilitates ‘recognition’.

---

# Synaesthesia

- The stimulation of one sensory modality triggers a perception in one or more different senses
  - Can you see sounds?
  - Can you smell colours?
  - Can you taste shapes?
  - Can you feel sounds?
-

---

# Two-sensory synaesthesia

- Coloured-hearing (when a sound triggers the perception of a colour)
  - Coloured-olfaction (when a smell triggers the perception of a colour)
  - Coloured-tactility (when a touch triggers the perception of a colour)
  - Coloured-gustation (when a taste triggers a colour)
  - Tactile-hearing (when a sound triggers tactile sensation)
  - Tactile-vision (when a sight triggers feeling shapes and textures pressing the skin)
-

---

# Synaesthesia

Synaesthesia can be of two types:

- Two-sensory synaesthesia (when stimulation of one modality triggers the perception in a second modality, in the absence of direct stimulation of this second modality)
  - Multiple sensory synaesthesia
-

---

# Multiple sensory synaesthesia

- Coloured-numbers (when numbers are heard or read they are experienced as colours)
  - Coloured-letters (when letters are heard or read they are experienced as colours)
  - Shaped-numbers (when numbers are heard or read they are experienced as shapes)
-

---

# Synaesthesia in Autism

- *“I was scared. I saw a yellow ‘z-z-z’ sound”*
  - *“The eyes saw the wrong word”* (in response to a verbal instruction)
  - *“In the shop I heard black, then the word broke down into pieces and they entered my eyes. I became blind because everything was black.”*
-

---

# Delayed perception

Do we live in the same time zone?

---

---

# Delayed perception

“As a child,.. it appeared as though I didn’t feel pain or discomfort, didn’t want help, didn’t listen or didn’t watch. By the time some of these sensations, responses or comprehensions were decoded and processed for meaning and personal significance, and I’d accessed the means of responding, I was fifteen minutes, one day, a week, a month, even a year away from the context in which the experience happened”

*(Donna Williams)*

---

---

# Delayed perception

“Some people think I am not paying attention when am asked a question, because of the pause I often need to process the question and my response, and the blank look I often have when concentrating on such processing. When people try to get my attention, they actually just distract me, slow me down, and annoy me horribly with their impatience.” (Jared Blackburn)

---

---

What we can do to help (Delayed processing):

Give them time to take in your question/ instruction and to work out their response. Be aware that autistic individuals often require more time than others to shift their attention between stimuli of different modalities and they find it extremely difficult to follow rapidly changing social interactions

---

---

# Intensity with which the senses work

- Hypersensitivity
- Hyposensitivity
- Fluctuation (Inconsistency of perception)



---

# Hypersensitivity

“I appear to have very sensitive ears, eyes and skin. Certain noises very definitely ‘hurt’ my ears and certain lights ‘hurt’ my eyes.”

*(Wendy Lawson)*

“There are certain things I touch that hurt my hands... There are times when I walk and the air brushing past my hands is a source of pain” *(McKean)*

---

---

“From child to child, sensory oversensitivity is very variable. It can range from mild (slight anxiety when the environment is too loud, too bright, or too chaotic) to severe, with an individual going into a screaming tantrum every time he is in a large supermarket.” (*Temple Grandin*)

---

---

# Hyposensitivity

“My senses would sometimes become dull to the point that I could not clearly see or hear, and the world around me would seemingly cease to exist...” (*Hawthorne*)

“I had no concept of my body... and I never experienced it... My body was a mere reflection in front of the mirror... I never felt any pain” (*Tito*)

---

---

## What we can do to help:

### *Hypersensitivities:*

- *Identify which stimuli the person finds disturbing and either eliminate them (e.g., use natural lighting instead of fluorescent lights) or, if impossible, provide the person with 'sensory aids' (tinted glasses, earplugs, etc.)*
- *Desensitize the person to tolerate the stimuli via sensory diet*
- *Monitor a number of simultaneous stimuli; reduce irrelevant stimuli*
- *If possible, warn the person about fire alarms, bells, etc.*

### *Hyposensitivities:*

- *Provide extra stimulation through the channels that work in 'hypo'*
-

---

Hypersensitivity can lead to:

- Disturbance by certain sensory stimuli
  - Fascination by certain sensory stimuli
-

---

Sensitivity to (disturbance by) certain stimuli

“The buzzer on the microwave oven, children’s voices, car horns, the bus bell people activate to tell the driver they want to get off, a kettle whistling... these are just some of the sounds I find unbearable”

*(Wendy Lawson)*

“Sudden loud noises hurt my ears – like a dentist’s drill hitting a nerve” *(Temple Grandin)*

---

---

## Disturbance by

- Certain stimuli
- Too many stimuli
- Any sudden unpredictable stimuli

---

Challenging behaviours caused by either

- ‘present but invisible’ antecedent, or
  - ‘past’ antecedent, or
  - ‘probable future’ antecedents
-

---

## What we can do to help:

- Remember, what we think is enjoyable (e.g., fireworks) may be fearful or overwhelming to an autistic individual.
  - Be aware of the colours and patterns of the clothes you are wearing and of your perfume.
  - Always warn a person about the possibility of the stimulus he is fearful of and show the source of it
-

- 
- Strategies to cope with light sensitivity are turning off any unnecessary lighting (esp. fluorescent lighting), using lamps rather than overhead lights, low wattage bulbs and tinted lenses.
-

---

As each individual is unique in their sensory profile, it is very difficult to adapt the environment for each individual's sensitivities. Often it is not the stimulus itself that can trigger what we call difficult behaviours, but rather the inability to control or predict it. The understanding of each individual's sensitivities is vital, or any interventions becomes a nightmare for both the person and those who work with him.

---

---

Fascination with certain stimuli

---

---

## What we can do to help:

- Make a list of pleasant stimuli for each individual. If you think the activities (behaviours) or materials the person uses for 'self-treatment' are inappropriate, identify their function and replace them with more appropriate ones.
  - Use 'objects of fascination' in the 'case of emergency' – to calm the person down after a painful/stressful experience.
-

---

# Inconsistency of perception

## Fluctuation

“Skin sensation was so unbearable one minute and yet completely unfelt next” (*Blackman*)

“ It is well documented that there are certain textures and patterns that are painful or displeasing to the touch of the person with autism. This is true from my own experience, but I am not able to tell you what they are because they are always changing. Day to day, hour to hour, sometimes even minute to minute. This can be very frustrating” (*McKean*)

---

---

# Vulnerability to sensory overload

*The information overload  
can be caused by:*

- The inability to filter out irrelevant, or excessive information (Gestalt perception);
  - Hypersensitivity;
  - Distorted or fragmented perception;
  - Delayed processing
-

---

## What we can do to help (Overload):

- It is important to recognize the first signs of sensory overload. It is better to prevent it than to 'deal with the consequences'
  - As soon as you notice early signs of coming sensory overload (which are different for different individuals), stop the activity and provide time and space to recover
  - Teach the individual how to recognize the internal signs and ask for help or use different strategies (e.g., relaxation) to prevent the problem
  - 'First Aid Kit' should be always at hand (sunglasses, ear plugs, squeeze toys, favourite objects, 'I need help' card, etc.)
-

---

*The overload can lead to several different routes they can (are forced) to take and may result in:*

- If they continue to try to process all the information coming in, despite their inability to keep up with it, it may result in hypersensitivity and/or fragmentation, that eventually bring anxiety, confusion, frustration and stress, that, in turn, leads to tantrums and difficult behaviours



- 
- Sensory agnosia (difficulty interpreting a sense):

“I looked at the beige-colored blob in front of me. Meaning had shut down not only through my ears but now through my eyes, too. I could see it but I had absolutely no idea what it was any more” *(Williams)*

---

---

## Adaptations and compensations:

- System shutdown
- If early in life – ‘self-imposed sensory deprivation’:

*‘When sensory stimulation became too intense, I was able to shut off my hearing and retreat into my own world... In pulling away, I may not have received stimulation that was required for normal development’ (Grandin)*

---

---

# Adaptations and compensations: Perceptual Styles

- *Mono-processing:*

- *using one sense at a time*

- "I have noticed that when I am using a particular channel to address a task, if I attempt to introduce another channel, then I lose my place in the completion of the task and need to begin again" (*Lawson*)

---

---

## What we can do to help (Mono-processing):

- A person who monoprocessees may have problems with multiple stimuli. Find out which channel 'is open' at the moment and reduce all 'irrelevant stimuli'
  - Always present information in the person's preferred modality. If you are not sure what it is or which channel is 'on' at the moment (in the case of fluctuation), use multisensory presentation and watch which modality 'works'. Remember, though, that they can switch channels.
-

---

# Perceptual Styles

- Peripheral perception



---

Direct perception hurts!

“I felt instantly unwell and sometimes terrified if I were face-to-face with a person...

To look at any face from a social distance was intolerable.” (*Lucy Blackman*)

---

---

# Peripheral perception

“Autistic people often glance out of the sides of their eyes at objects or other people. They have very acute peripheral vision and a memory for details that others miss. Gazing directly at people or animals is many times too overwhelming for the autistic one... It can feel creepy to be searched with the eyes” *(O’Neill)*

---

---

## What we can do to help (Peripheral perception):

- Never force eye contact
  - Do not approach the person directly in his hypersensitive modalities.  
When hypersensitivity of the affected sensory channel is addressed and lessened, the direct perception becomes easier
-

---

Compensating for unreliable sense by  
other senses

*One sense is never enough*

---

---

## What we can do to help (Compensation):

- It is important to let the individuals use the sensory modality they prefer to ‘check’ their perception.
  - With appropriate treatment and environmental adjustments to decrease hypersensitivities they gradually learn to use their sense organs properly – eyes to see, ears to listen, etc.
-

---

## Are 'unusual' responses to sensory stimuli 'bizarre' and 'abnormal'?

- 'Bizarre' behaviours as compensatory strategies to regulate their systems and cope with information overload
- These self-stimulatory behaviours may serve several purposes and one and the same behaviour may have different underlying causes

*“A lot of self-stimulation, including rocking the body, swaying, flapping the hands, rubbing the skin and countless others, are pleasurable, soothing connections with the senses” (O’Neill)*

---

---

# Functions of stimming:

- **Defensive:** (to reduce pain or discomfort caused by hypersensitivity, fragmentation, overload, etc.)

*“to eliminate sensory assault that interferes with functioning” (Shore)*

- **Self-stimulatory:** (to improve the input in case of hyposensitivity, e.g.)
-

- 
- **Compensatory:** (to interpret the environment in the case of 'unreliable' sensory information)

*“I was coping in a world where other people effectively realised nothing of that. I reacted to all this bombardment and confusion with those physical movements, silence and strange sounds which are generally lumped together as ‘autistic behaviours’ (Blackman)*

---

---

- Out of frustration:

*“Sometimes head banging and knuckle nibbling, tantrums, or outbursts happen as a way of letting someone know enough is enough!” (Lawson)*

- ***Just pleasurable experiences*** (that help to withdraw from a confusing environment)

*“Rocking and spinning were other ways to shut out the world when I became overloaded with too much noise. Rocking made me feel calm. It was like taking an addictive drug. The more I did it the more I wanted to do it” (Grandin)*

---

---

# Autism Spectrum

Temple Grandin:

*There is a continuum of sensory processing problems for most autistic people, which goes from fractured, disjointed images at one end to a slight abnormality at the other.*

---

## POSSIBLE PATTERNS OF SENSORY EXPERIENCES IN AUTISM

	Vision	Hearing	Tactility	Smell	Taste	Proprioception	Vestibular
1. Inability to filter foreground and background information ('Gestalt' perception)	Inability to filter visual stimuli. 'Optical disillusions	Inability to screen out background noise	Inability to distinguish between tactile stimuli of different intensity	Inability to distinguish between strong and weak smells	Inability to distinguish between strong and weak tastes	Inability to co-ordinate body position and movements of body parts	Inability to distinguish between 'inner' and 'outer' movements
2. Intensity the senses work	Hyper-, hypo-	Hyper-, hypo-	Hyper-, hypo-	Hyper-, hypo-	Hyper-, hypo-	Hyper-, hypo-	Hyper-, hypo-
3. Sensitivity to (disturbance by) some stimuli	Light/colour sensitivity. Disturbance by some patterns	Disturbance by some sounds	Sensitivity to certain textures	Disturbance by some olfactory stimuli	Disturbance by some gustatory stimuli	Disturbance by certain body positions	Intolerance of certain movements
4. Fascination with certain stimuli	Fascination with patterns, lights, colours	Fascination with sounds	Fascination with tactile stimuli	Fascination with certain smells	Fascination with certain flavours	Fascination with certain body movements	Excessive physical movements
5. Inconsistency of perception (Fluctuation)	Fluctuation between hyper- & hypo; 'in' – 'out'	Fluctuation between hyper- & hypo; 'in' – 'out'	Fluctuation between hyper- & hypo; 'in' – 'out'	Fluctuation between hyper- & hypo; 'in' – 'out'	Fluctuation between hyper- & hypo; 'in' – 'out'	Fluctuation between hyper- & hypo; 'in' – 'out'	Fluctuation between hyper- & hypo; 'in' – 'out'
6. Fragmented perception. Partial perception	Seeing 'in bits'. Prosopagnosia	Hearing 'in bits'	Feeling touch, cold/hot 'in bits'	Smelling 'in bits'	Tasting 'in bits'	Feeling only some parts of the body	'Uneven' movements
7. Distorted perception	Poor/distorted depth & space perception; seeing 2D world; distortions of shape, size, etc.	Hearing distorted sounds, etc.	Distorted tactile perception	Distorted olfactory perception	Distorted gustatory perception	Distorted perception of body	Distorted perception of body movements
8. 'Sensory agnosia' (Difficulty interpreting a sense)	'Meaning-blindness'. Feeling/acting 'blind'	'Meaning-deafness'. Feeling/acting 'deaf'	'Touch deadness'	Difficulty interpreting smells	Difficulty interpreting tastes	Difficulty interpreting body position/body sensations, etc.	Difficulty interpreting body/head movements
9. Delayed perception	Delayed processing of visual stimuli	Delayed processing of auditory stimuli	Delayed processing of tactile stimuli	Delayed processing of smells	Delayed processing of tastes	Delayed processing of body postures	Delayed processing of movement of the head/body
10. Vulnerability to sensory overload	Visual overload	Sound overload	Tactile overload	Olfactory overload	Gustatory overload	Proprioceptive overload	Vestibular overload

---

Differences in perception lead to  
development of different abilities, thinking  
styles and communication

---

---

“Learning how each individual autistic person’s senses function is one crucial key to understanding that person” *(O’Neill)*

---