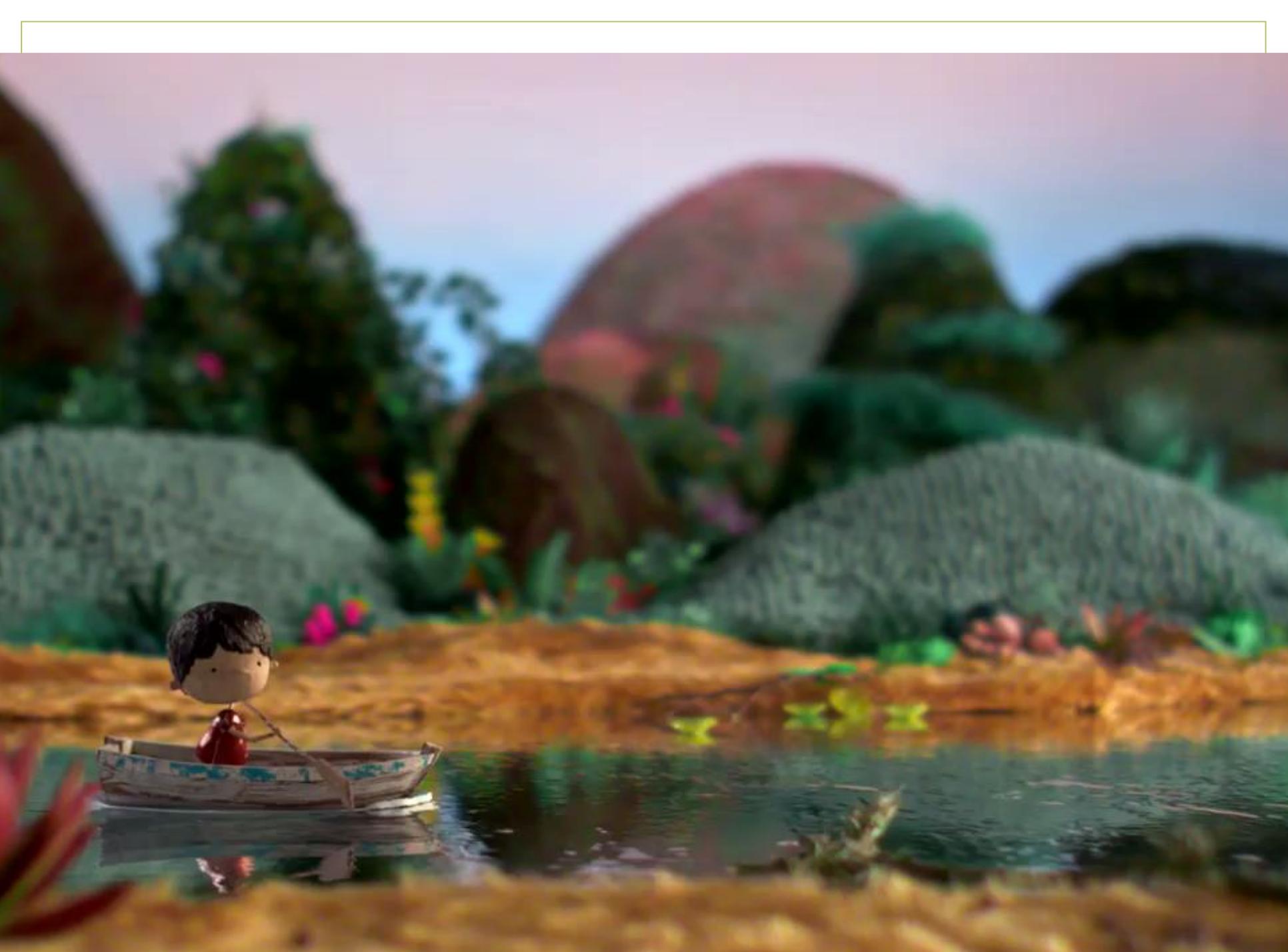


# Seeing the Spectrum: Optometry's Role in Autism



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# What is ASD?



- Defined as a broad spectrum of developmentally delayed conditions generally characterized by social skills challenges and repetitive behaviors
- One out of 40 children are diagnosed
- Four more times likely in males than females
- No single cause
  - Combination of genetics and environmental factors
- Two main categories of ASD:
  - Pervasive developmental disorder- not otherwise specified (PDD-NOS)
  - Asperger's syndrome

# Characteristics of Autism



## Visually Related

- poor eye contact
- side viewing
- excessively attentive to objects
- repetitively lining up objects
- staring at lights or spinning objects

## Non-Visually Related

- delays in both understanding and using language (receptive/expressive)
- nonverbal communications
- difficulty in social interactions
- restrictive patterns of behavior
- Delays in motor control

# Focal and Ambient Pathways



- Most of the visual symptoms of autism can be explained by the inadequate integration between the two visual processing pathways: focal and ambient
- Focal visual pathways
  - information on what is being seen or observed centrally
- Ambient visual pathways
  - information on where an object is in relation to where we are in space





**Table 2.1 Ambient vs. focal vision**

<b>Ambient vision</b>	<b>Focal vision</b>
“Where am I/Where is it?” function	“What is it?” (object recognition) function
Dynamic (kinetic)—identifies movement, change	Static—identifies stable features of surroundings
Low-resolution non-color vision (rods)	High-resolution color vision (cones)
Involves entire visual field	Involves only central vision—limited to central two degrees of visual field (fovea)
Not degraded at night	Degraded at night
Largely non-conscious	Largely conscious
Integrates with other sensory systems	Works in isolation
Is largely learned, and thus can be greatly enhanced through a program of visual management	Is innate rather than learned

# Tunnel Vision



- First described in 1971
- common symptoms in individuals with autism
- Stimulus overselectivity- when a person focuses on only one aspect of the environment or an object while ignoring his/her surroundings
- One theory states, processing the surroundings as a whole can become overwhelming and cause over arousal





“Eighty percent of the information we receive comes from the visual sensory system. When we cannot obtain visual information from the environment due to some kind of receptive problem, we then start to see changes in performance or behavior.” - Dr. Melvin Kaplan

# Binocular Vision



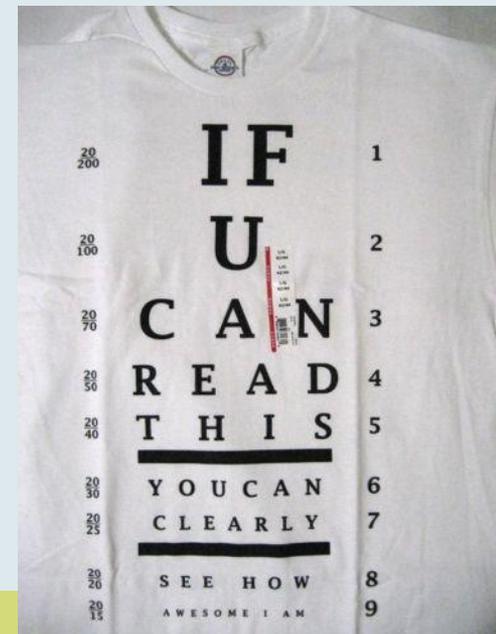
- Children with Autism can look at objects or others from the corners of their eyes
  - Self regulating due to the excessive amounts of local information and decreasing movement perception
- 34 autistic children were evaluated, ages 2 to 11 years old, for eyesight, oculomotor skills and alignment and stereopsis
  - Results show compared to 3.7 percent for developmentally typical population, **21** percent of their children has strabismus and a high incidence of difficulty with pursuits.



# Binocular Vision Continued



- Significantly reduced near point of convergence in both low and high functioning ASD
- Overall, research has shown poorer binocular and monocular visual acuity in the ASD population
- Similar refraction distribution



# Yoked Prism



- **Purpose:** Shifting the world in a specific direction disrupts the ambient system which encourages re-integration of the focal and ambient pathways
- **Kaplan Yoked Prism Study**
  - fourteen ASD children, with a mean age of 13 years old, to see how they react in terms of head tilt, body posture, facial expressions during visual pursuits, ball catching, and watching TV with one group wearing yoked prism and the other group wearing placebo lenses over four months
  - **Conclusion:** a lower heart rate and increased electrodermal responses when viewing emotional videos through yoked prism lenses compared to the placebo lenses

# Occupational Therapy

- According to American Occupational Therapy Association, occupational therapist "help people across the lifespan participate in the things they want and need to do through the therapeutic use of everyday activities" whether it be for injury rehabilitation or helping children to participate fully in school and social situation.



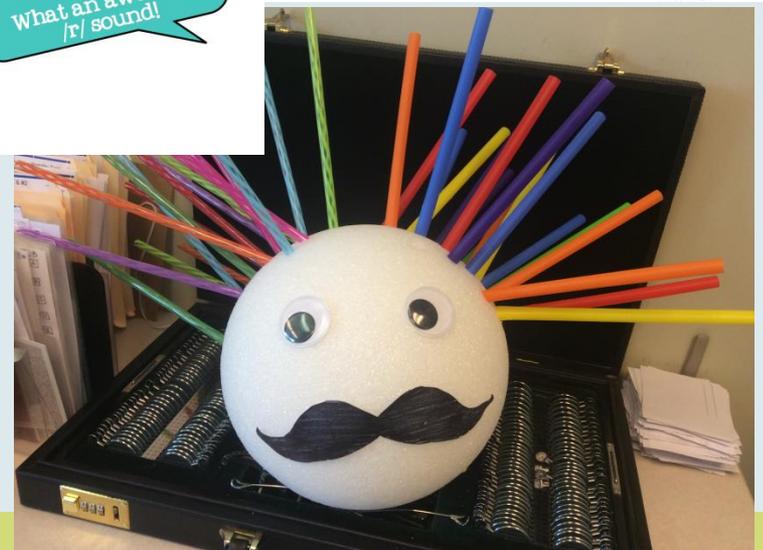
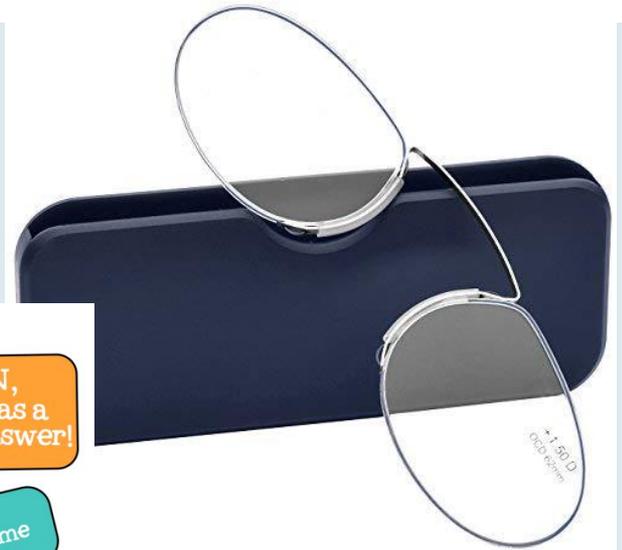
# Vision Therapy



- AOA defines vision therapy as “a sequence of neurosensory and neuromuscular activities individually prescribed and monitored by the doctor to develop, rehabilitate and enhance visual skills and processing”
- The goal of vision therapy is unique for each individual depending on his/her goals



# Adaptations!



# Visual Spatial Skills

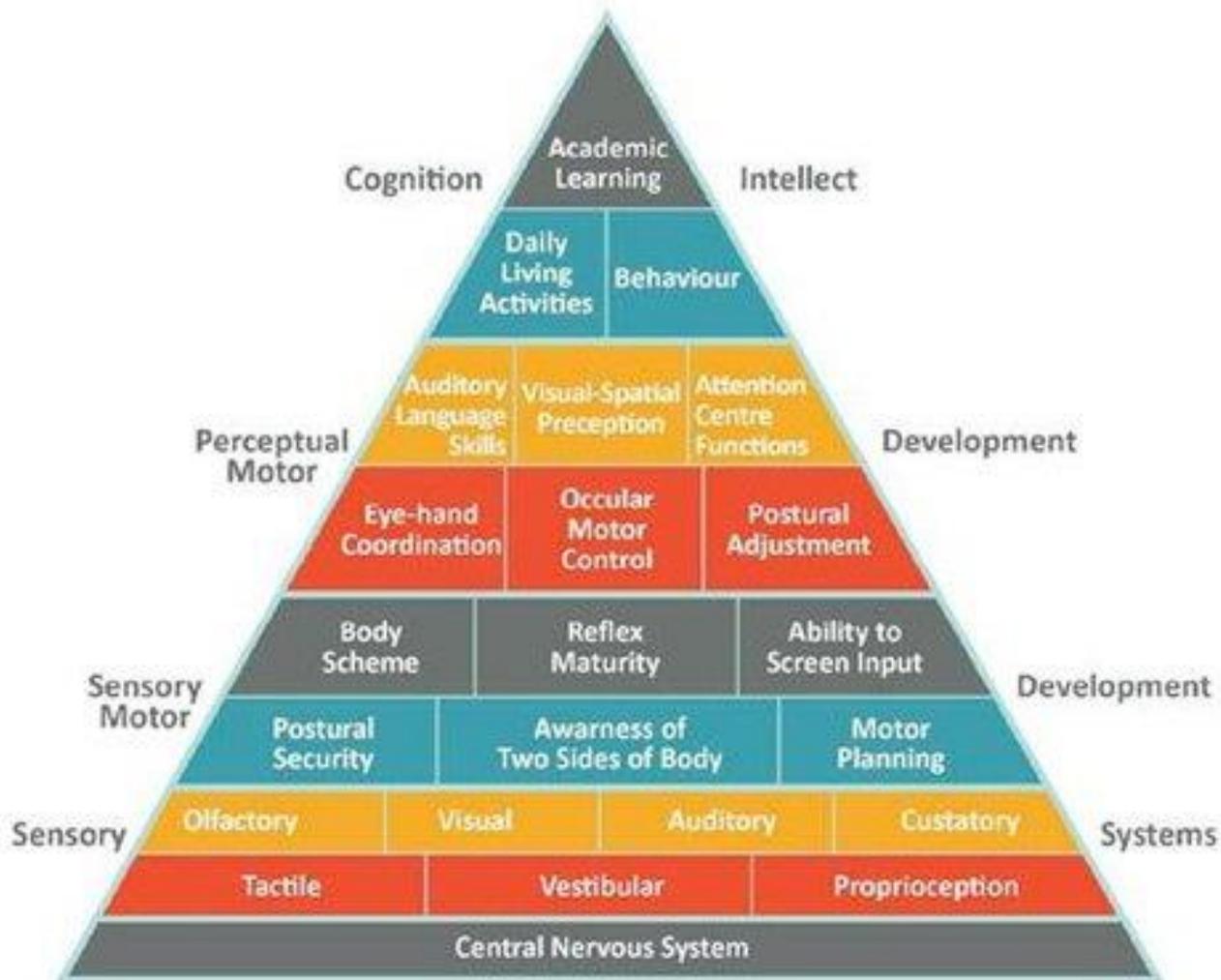


- Visual spatial processing relates to one's internal map, meaning, one's body awareness and locating one's own body in space
- The inability to process spatial information can be related to poor oculocentric, headcentric and bodycentric localization
- Higher order visual-spatial abilities translates into conservation of space, visual-logical reasoning, representational thought
- Letter reversals to toe or duck walking

I like to play doll.



# PYRAMID of LEARNING



# Color Perception



- ASD children demonstrate difference in color discrimination, color memory, and detection of color on achromatic backgrounds
- Parents of children with autism often say their children will not eat any food of a specific color or will not play with a set of toys that are of a certain color
- What can we do?
  - colored lenses, colored overlays and syntonics
- Photosensitivity is one of the common symptoms associated with autism. Research shows increased repetitive behavior for ASD children when in a room illuminates by fluorescent lightning versus a room with incandescent lightning

# Adaptations to exam



#30651064

# Research



- According to a pilot study involving 61 children ages 9 to 17 years old, patients on the spectrum can complete most vision and eyesight test within an examination protocol.
- In fact, only the intraocular pressure (IOP) testability was reduced, especially for nonverbal or minimally verbal patients.

Sight Gags by Scott Lee, O.D.

