

Autism and My Path Through Life, 3rd Edition



Temple Grandin, Ph.D.
Professor of Animal Science
Colorado State University

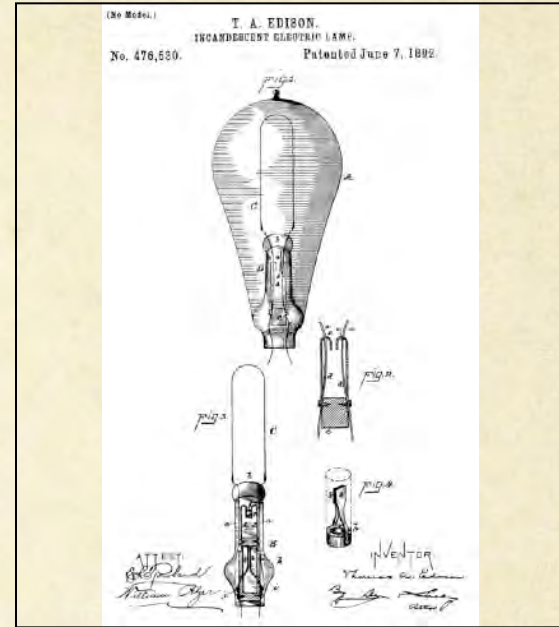


No Speech Until Age 4

Brain Variability

- Cognitive versus more social emotional
- Person with Autism has more relatives in technical careers
- Person with Bipolar as more relatives in creative careers

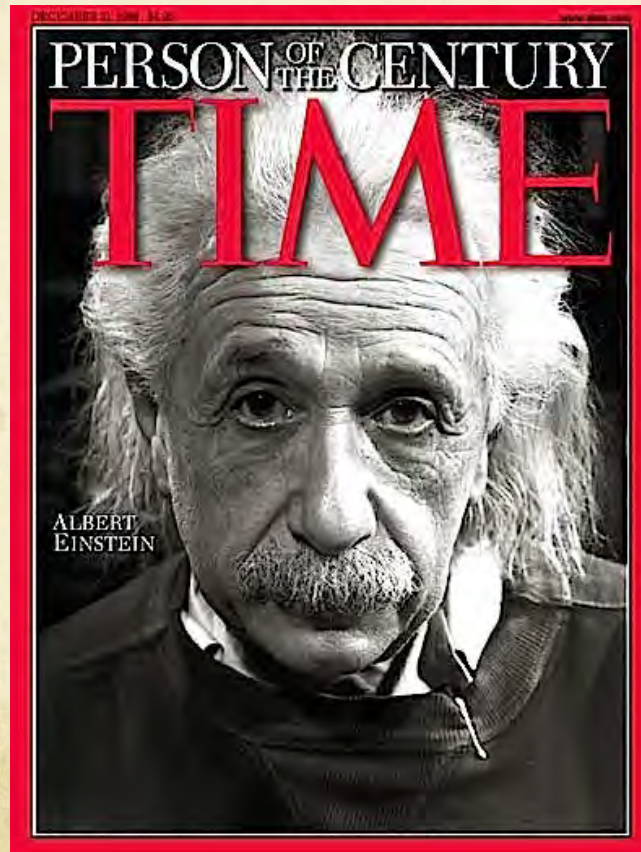
Thomas Edison



- Labeled Addled and Hyperactive
- Memorized Every Street

Albert Einstein

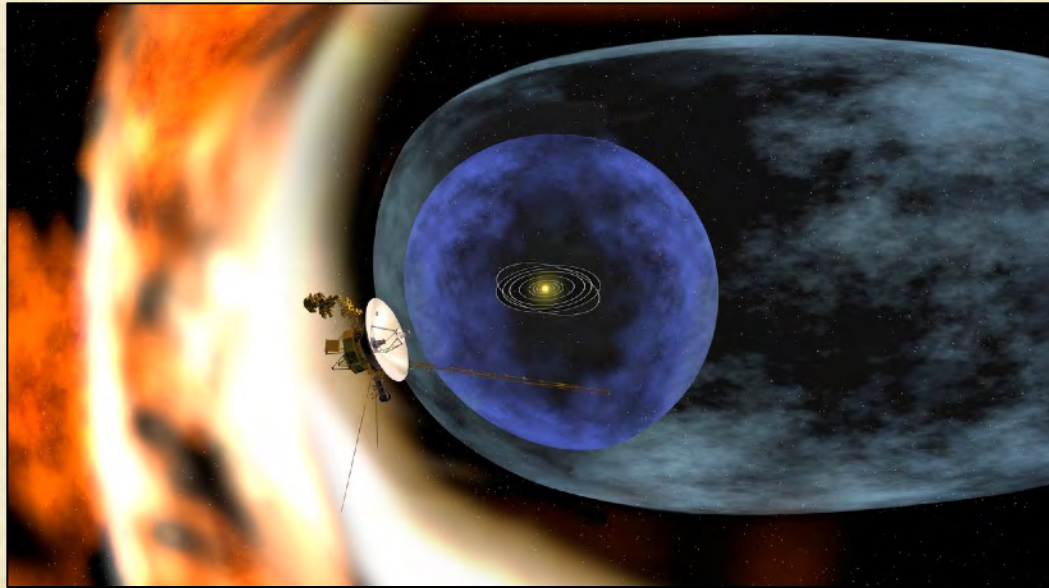
No speech at age 3 Temper tantrums





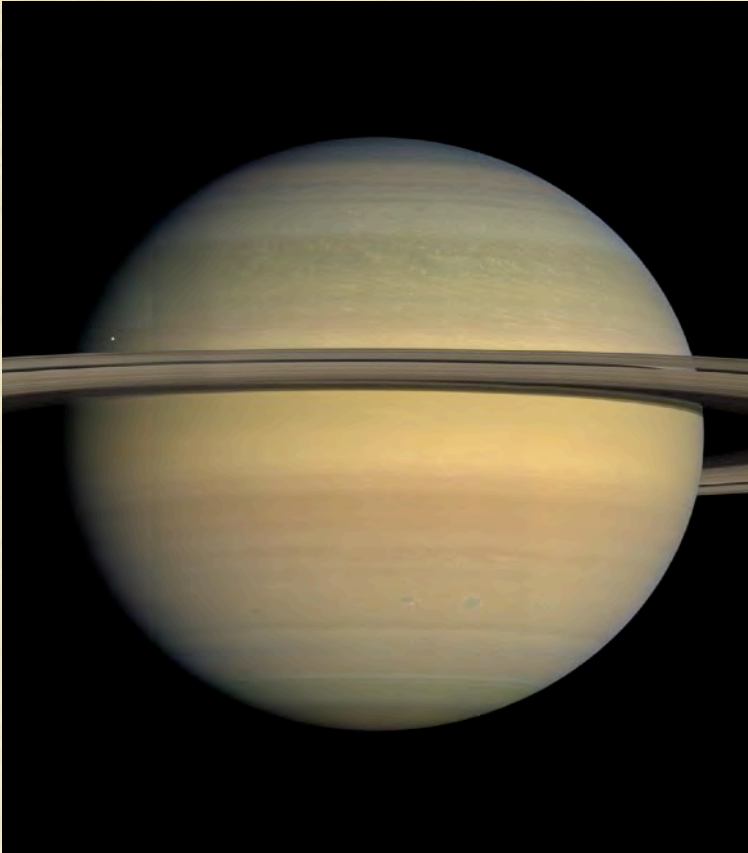
Emotions are Different

I cried when I read about the 81-year-old scientist who keeps the 40-year Voyager Space Crafts alive.

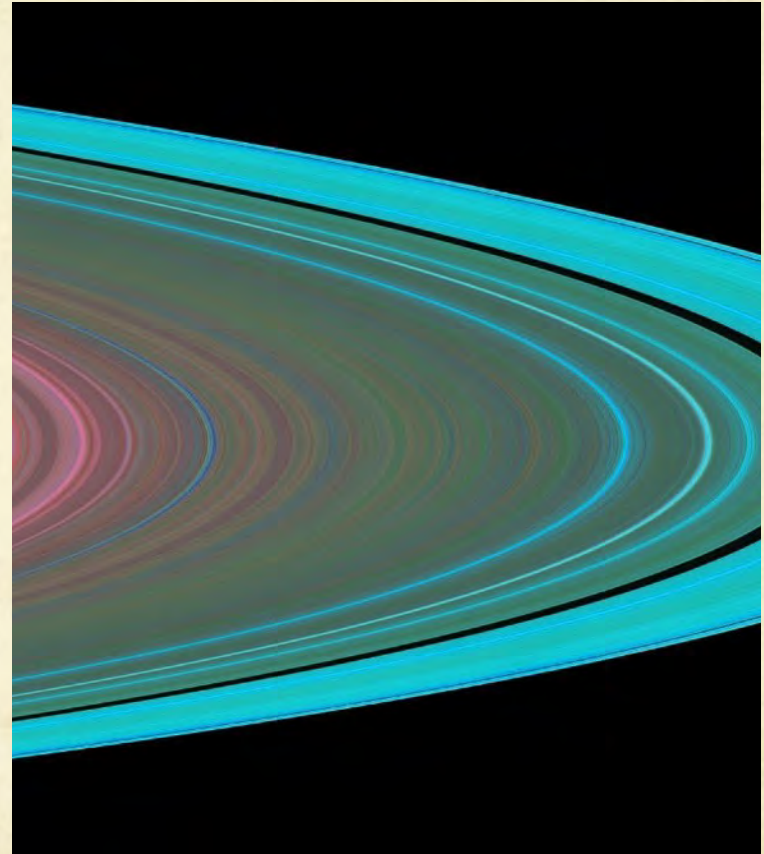


Credit: NASA/JPL

Saturn



Saturn Rings



Credit: NASA/JPL

Voyager has left our solar and we are still learning from it



Credit: NASA/JPL



Ultimate NASA Geek Out



Do Not Become

Hung Up on Labels

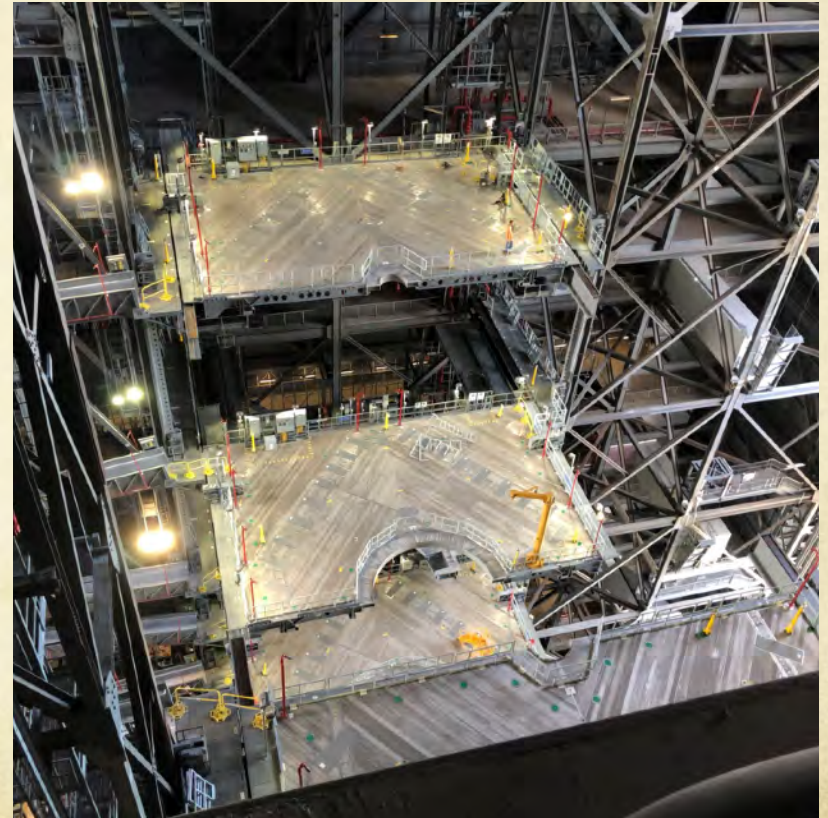
-
- DSM-5 autism is a huge spectrum ranging from top scientists, artists, and musicians to severe behavioral problems which makes normal activities impossible.
 - At age 3, non-verbal kids that become high functioning and kids that remain severely impaired look similar.

-
- Grandparents and parents often tell me they have autism after a child was diagnosed
 - Most had successful careers.
Learned work skills as children
 - Diagnosis helps fully verbal teens and adults with relationships
-

Too Many Kids Become Their Labels and Never Get to Do the Fun Stuff



Visiting the Vehicle Assembly Building Was an Emotional Experience



Foundation Principles

- ✓ Sudden surprises scare
- ✓ Continuous gradual stretching to gain new skills
- ✓ Do not overprotect
- ✓ Continually teach life, social, and work skills
- ✓ Limit screen time and give your child choices of interesting real activities



- A good teacher is gently insistent
- Early educational programs for non-verbal children are essential
- Don't Wait! Grandmothers may be the best volunteers!

Teach Turn Taking

- ✓ Learn how to wait and take turns
- ✓ Teach with board games or an electronic game
- ✓ Phone **MUST BE** physically passed back and forth between two or more individuals

Use Teachable Moments When the Child Makes a Social or Manners

- ✓ No Yelling!
- ✓ Never say NO or STOP IT
- ✓ Calmly give the instruction and tell the child what he/she should do. Also explain the reason why you use normal language.

- A child has to be stretched just outside his/her comfort zone to keep learning new skills
- Pushing too hard causes sensory overload and no progress
- Never have sudden surprises. This causes fright and tantrums
- Adults and teenagers must also be pushed to try new things and keep learning
- Create opportunities for child to use language and build on normal behavior

- Limit video games and video watching to one hour on weekdays, two hours on weekends
- Do not allow a child to become a recluse in his/her bedroom
- Do allow some calming down time for stimming or electronics
- Recent studies show greater risk for depression in teen's excessive social media use

- Provide choices when doing a “stretching” activity
- Examples of stretching activities:
 - Karate or Cub Scouts
 - Robotics or soccer
 - Theater or band
 - Debate club or Star Trek Club
- The activities should involve interaction with other people outside the home

Child blocks ears because certain sounds hurt



Sounds are better tolerated when the
child initiates them.

Little Rainman by Karen Simmons

- Give the child or adult control over stimulus exposure
- Do not wear head phones all the time. They make ears more sensitive
- Keep head phones with you. Try NOT to wear them

Sensory Perception in Autism

“Sensory symptoms are core primary characteristics of the neurobiology of autism.”

- Robertson and Simon Baron-Cohen, 2017;
Nature Reviews - Neuroscience
-

Auditory Threshold Normal



Echolalia increases as receptive language becomes worse.
Jacqueline Roberts, 1997



Hearing auditory detail is impaired



Stretch out and enunciate
consonants



Hearing may be like a bad mobile
phone connection



Occurs with many disorders

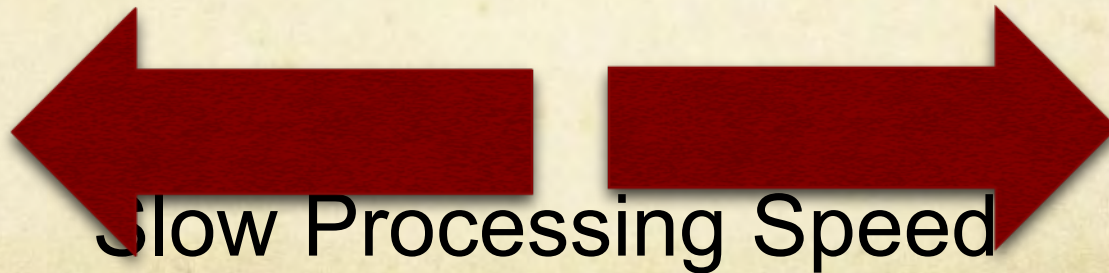
Hearing may fade in and out like
a poor mobile phone connection

Echolalic Children Use Phrases from Movies in the Real World

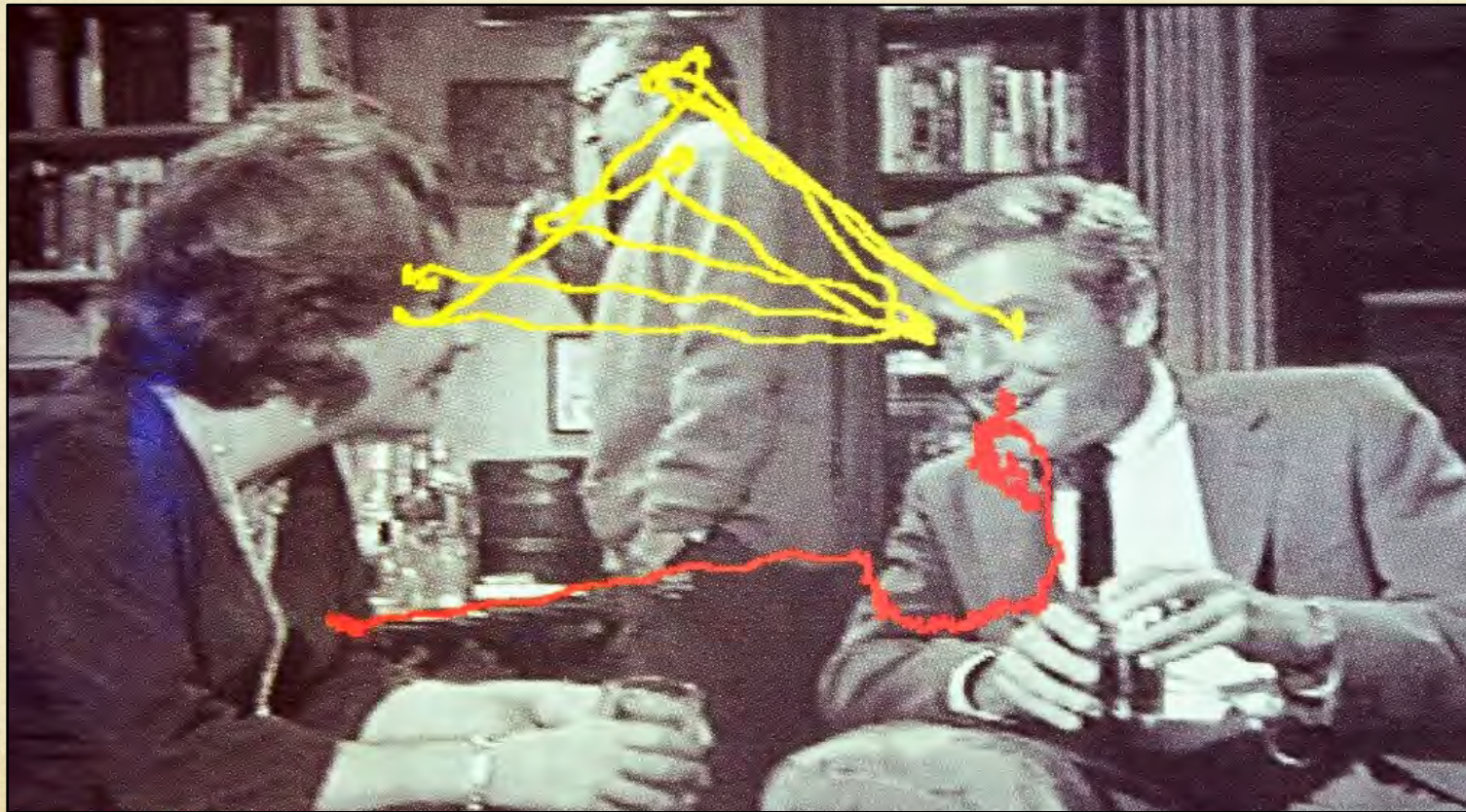


Attention shifting slowness occurs with many disorders

Takes longer to shift back
and forth between
two different things



Viewer with Autism (Red Line)
Normal Comparison Viewer (Yellow Line) Shows Attention Shifting Slowness



Ami Klin

Give the Child Time to Respond Their Brain May be Like a Phone With A One Bar Signal

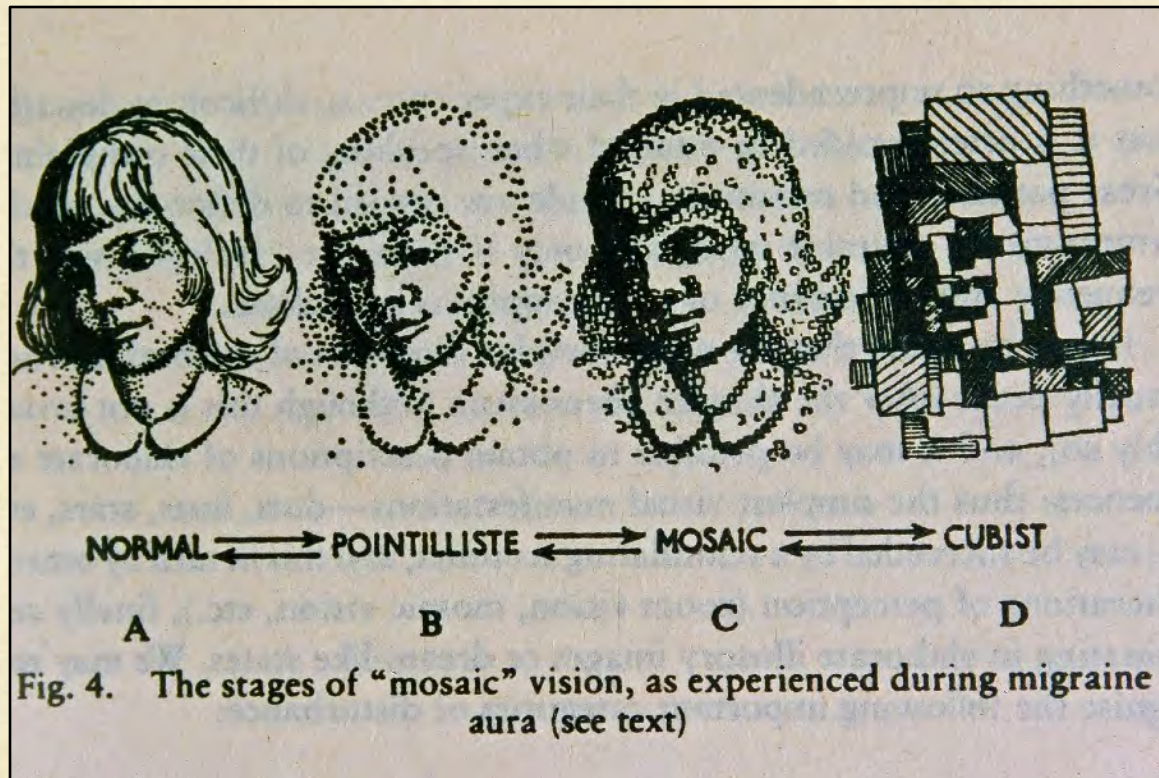


Photo Credit: dappered.com



Photo Credit: Clarisa Clarity

Visual images break up and fragment similar to migraine headaches



Oliver Sacks

Examples of Video Interference



Source: www.snug.com

Signs of Visual Processing Problems in Autism, Dyslexia, and Sensory Processing Disorder

- ✓ Hates escalator
- ✓ Print jiggles on the page during reading
- ✓ Eye exam may be normal



Words vibrate and jiggle on page

. Trends in Neurosciece, Vol. 20, pp. 147-152, 1997

PERSPECTIVES

J. Stein and V. Walsh – Temporal processing and dyslexia

Worbs ~~can be~~ hard to read for several different reasons

Fig. 1. *Words can be hard to read for several different reasons. Visual confusions can cause letter reversals ('worbs'), distortion and blurring ('can be hard to read') and superimposition ('for several different').*

Dyslexia is caused by defects in brain circuits which process fast moving auditory and visual information. Reading and doing number work with one eye may improve reading and help stabilize abnormal eye movements.

Interventions for Visual Processing Problems

Incandescent lamp by desk



Block fluorescent lights or LED with a hat

Laptop or tablet computer



Gray, tan, or pastel paper for reading

Irlen lenses or pale colored glasses

Balancing games - sit on ball



Prism glasses - Developmental Optometrist



Severe Sensory Problems

- Extreme effort required to screen out background noise and visual distractions
- Needs frequent breaks to prevent sensory overload
- Mono-channel
- Body boundary problems
- Often an auditory thinker

Environmental Enrichment is an Effective Treatment for Autism

- ✓ Stimulate two senses simultaneously
 - ✓ Adjunct to ABA and speech therapy
 - ✓ One of the senses is always smell or touch
 - ✓ Novelty and keep changing the stimulation
 - ✓ Use simple economical things. Two 15 minute sessions per day
-

Nonverbal Individuals who Type Independently Describe Severe Sensory Problems

- ❖ *How Can I Talk if my Lips Don't Move* by Tito Rajarish Muhopadhyay
- ❖ *Carly's Voice* by Arthur Fleischmann with Carly Fleischmann
- ❖ *The Reason I Jump* by Naoki Higashida
- ❖ *Fall Down 7 Times Get up 8* by Naoki Higashida

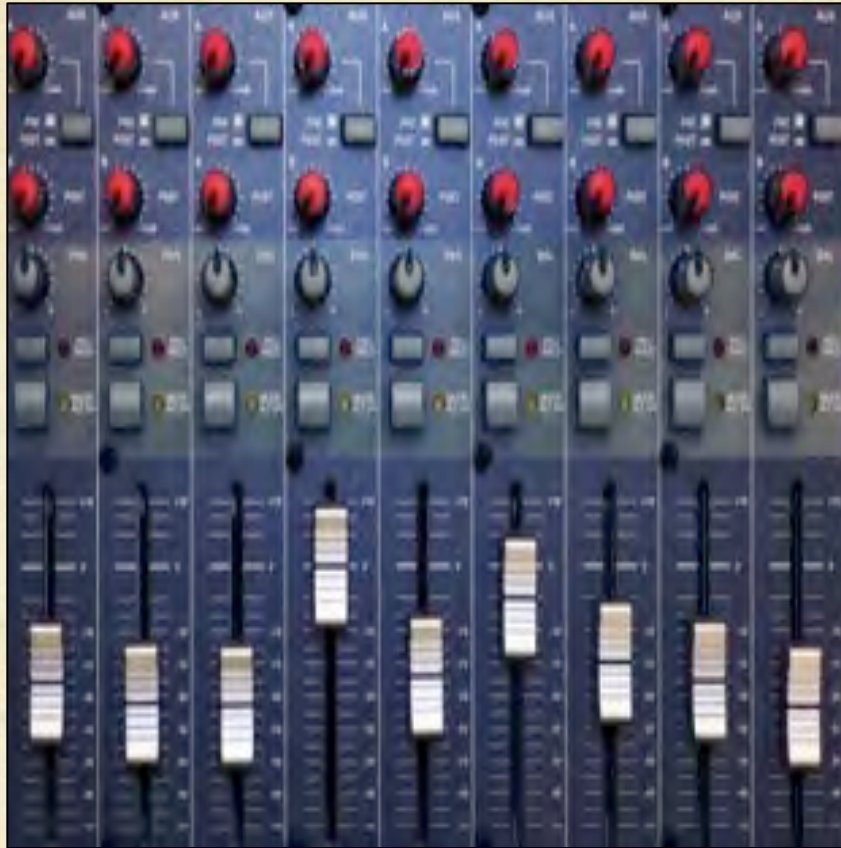
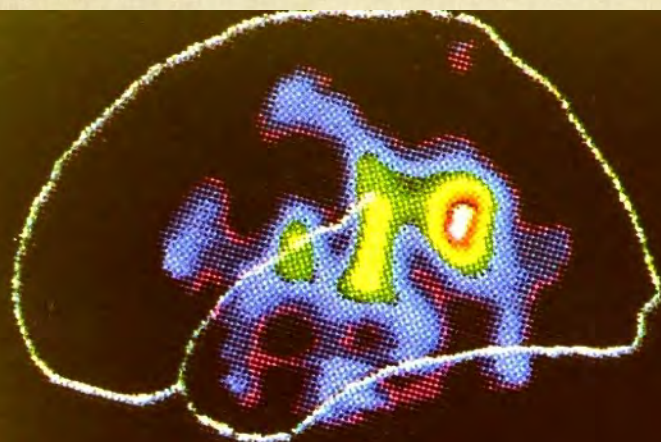
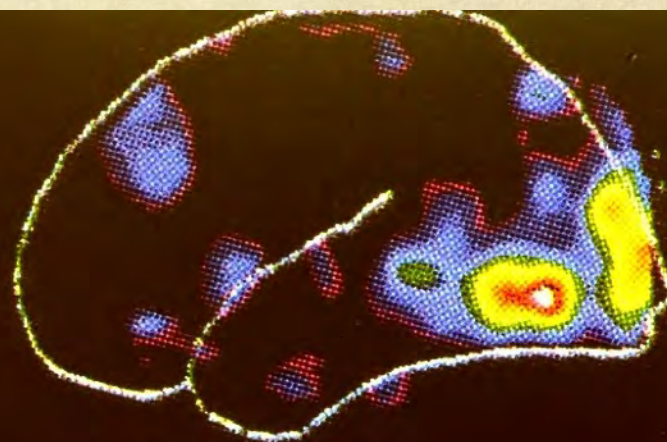


Photo Credit: Matt
Hall, *Agile*

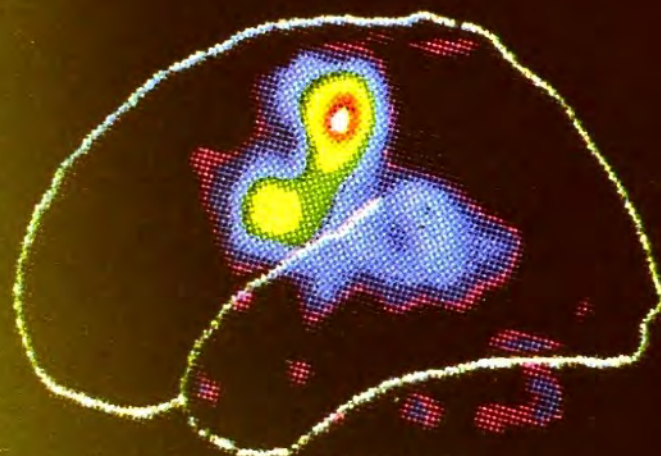
A music mixing board is a good model for many different personality traits. There is no firm dividing line between mild autism and geeks and nerds.



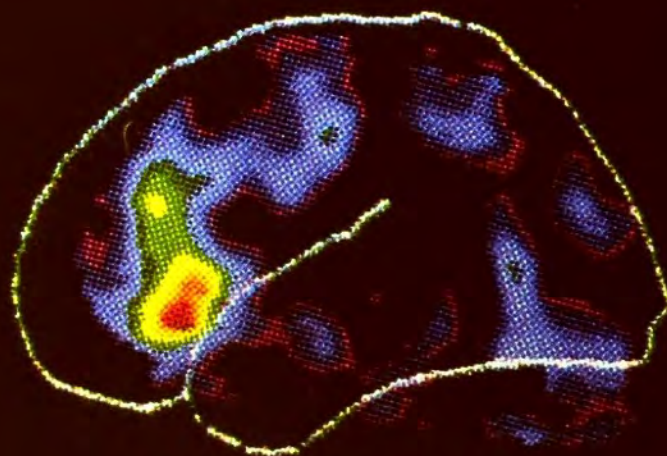
HEARING
WORDS



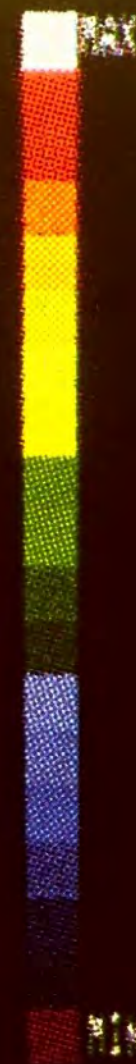
SEEING
WORDS



SPEAKING
WORDS

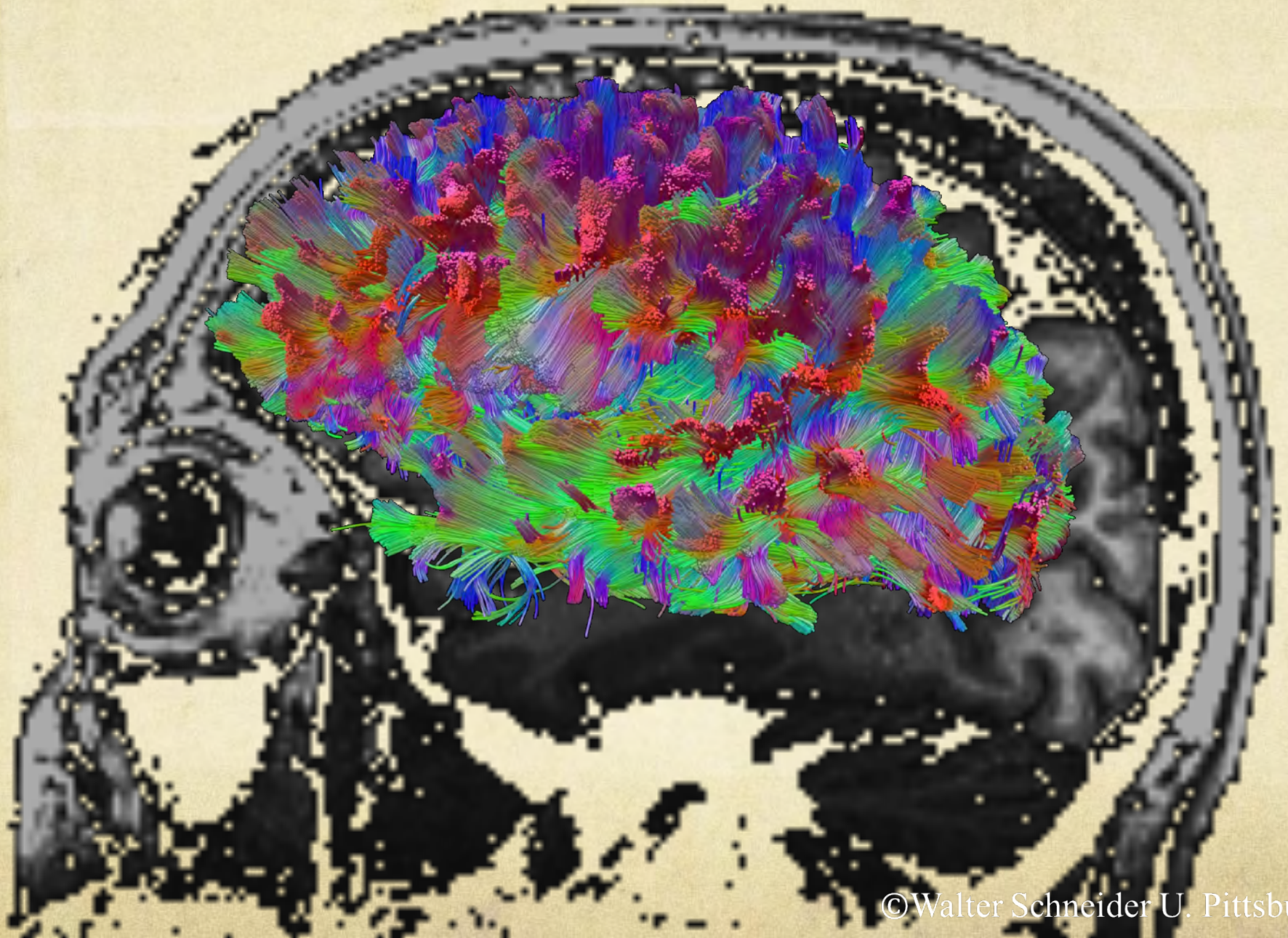


GENERATING
WORDS

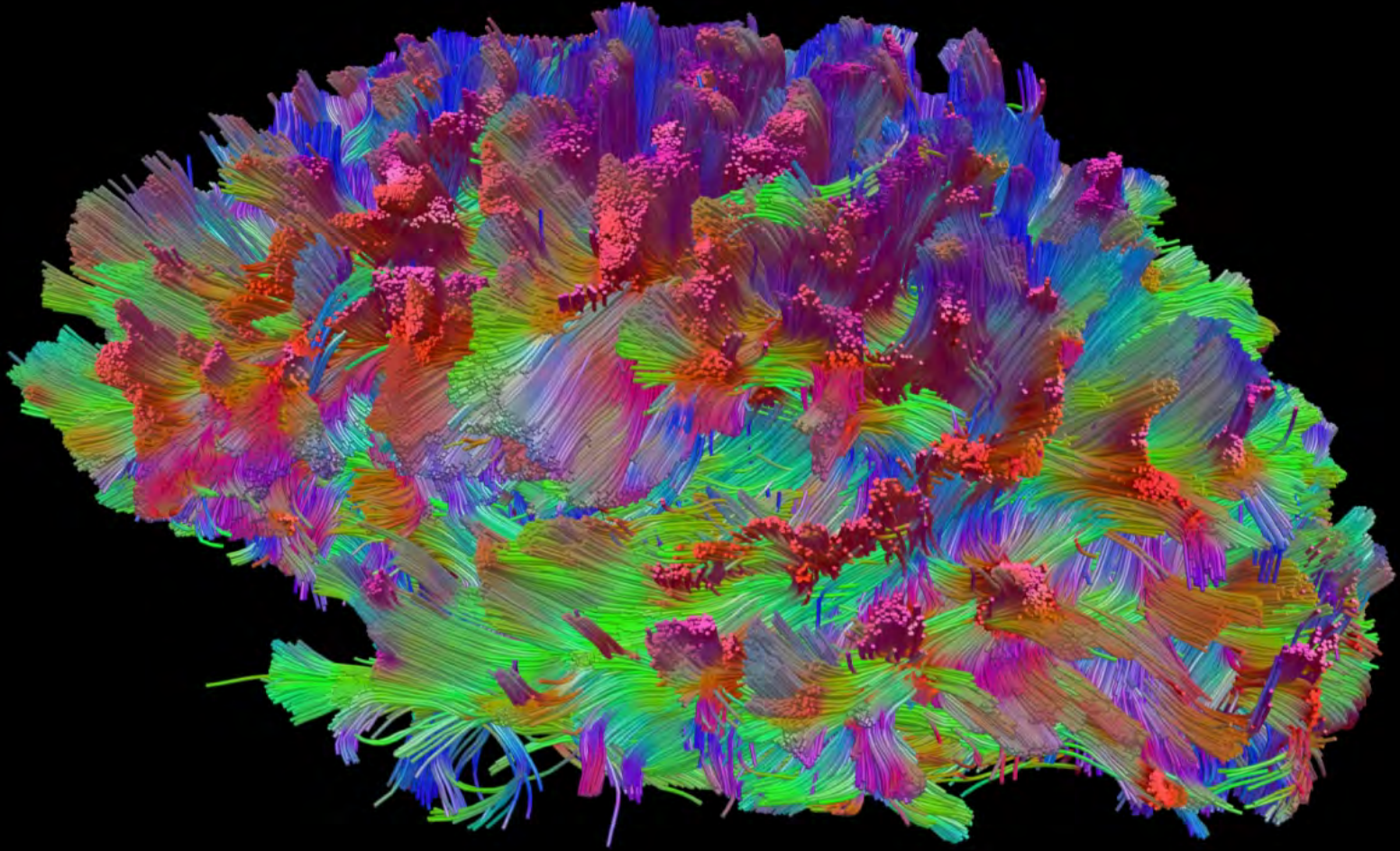


Structural MRI

Connections



High Definition Fiber Tracks of Temple Grandin

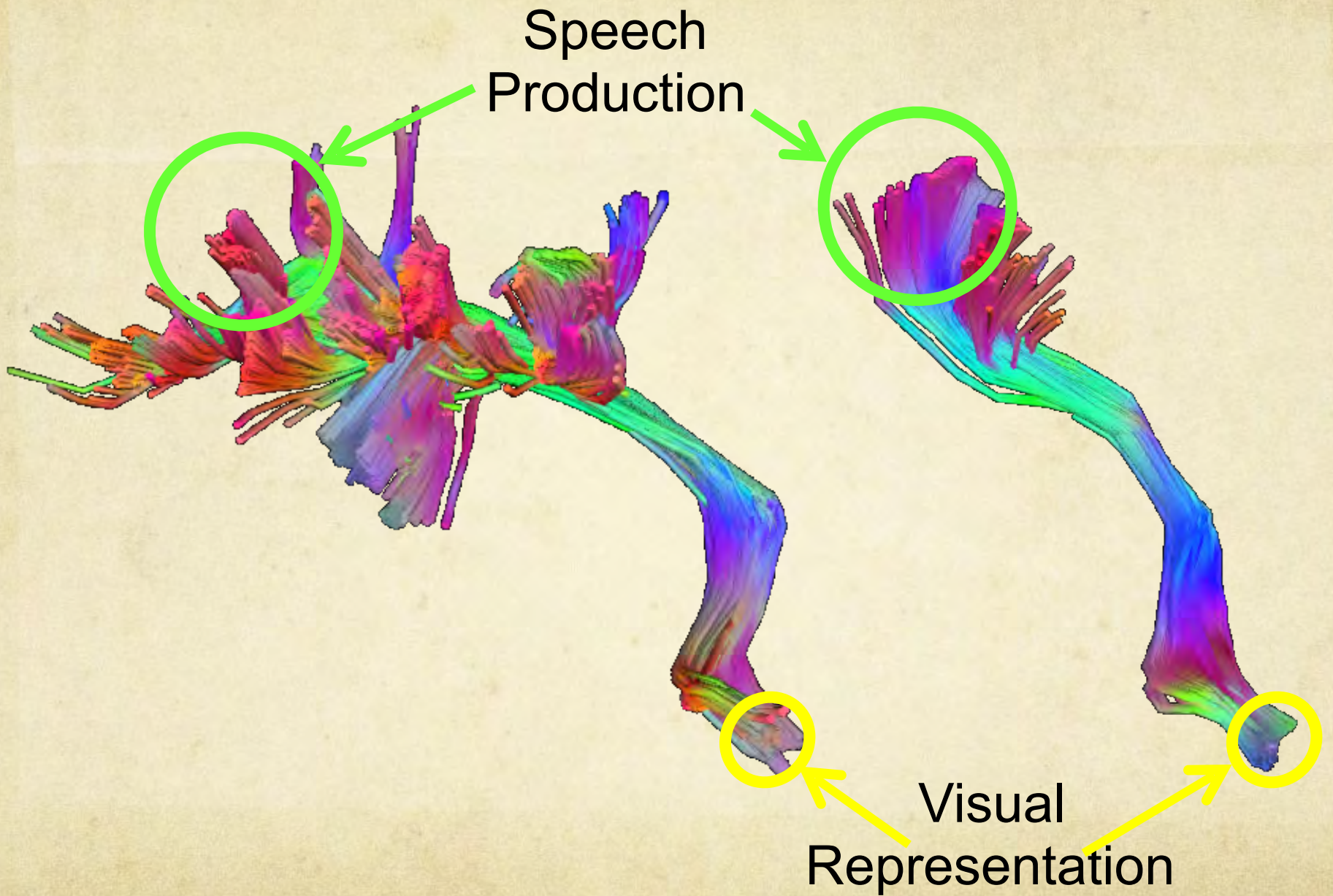


Axon Projection Field Much Less Organized

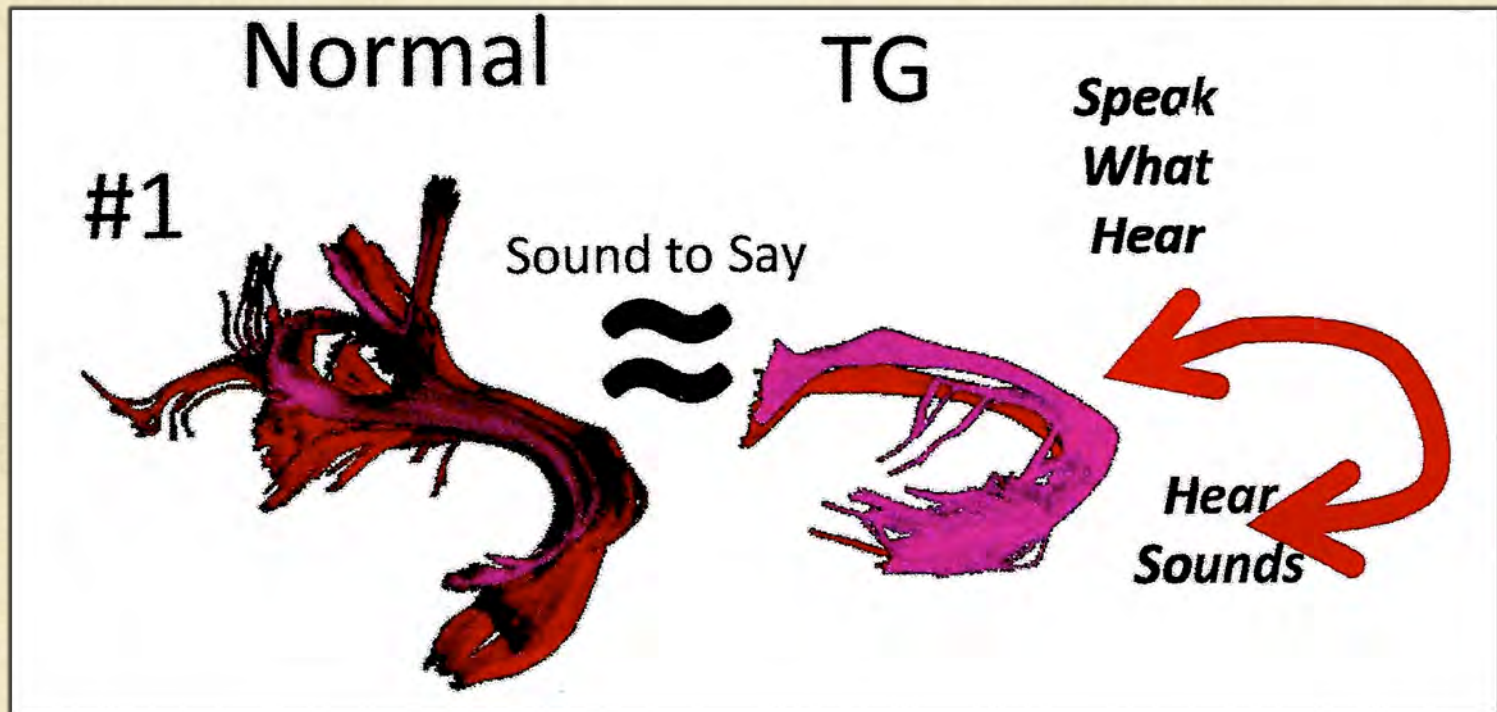
Temple Grandin

Normal Age
Matched Subject



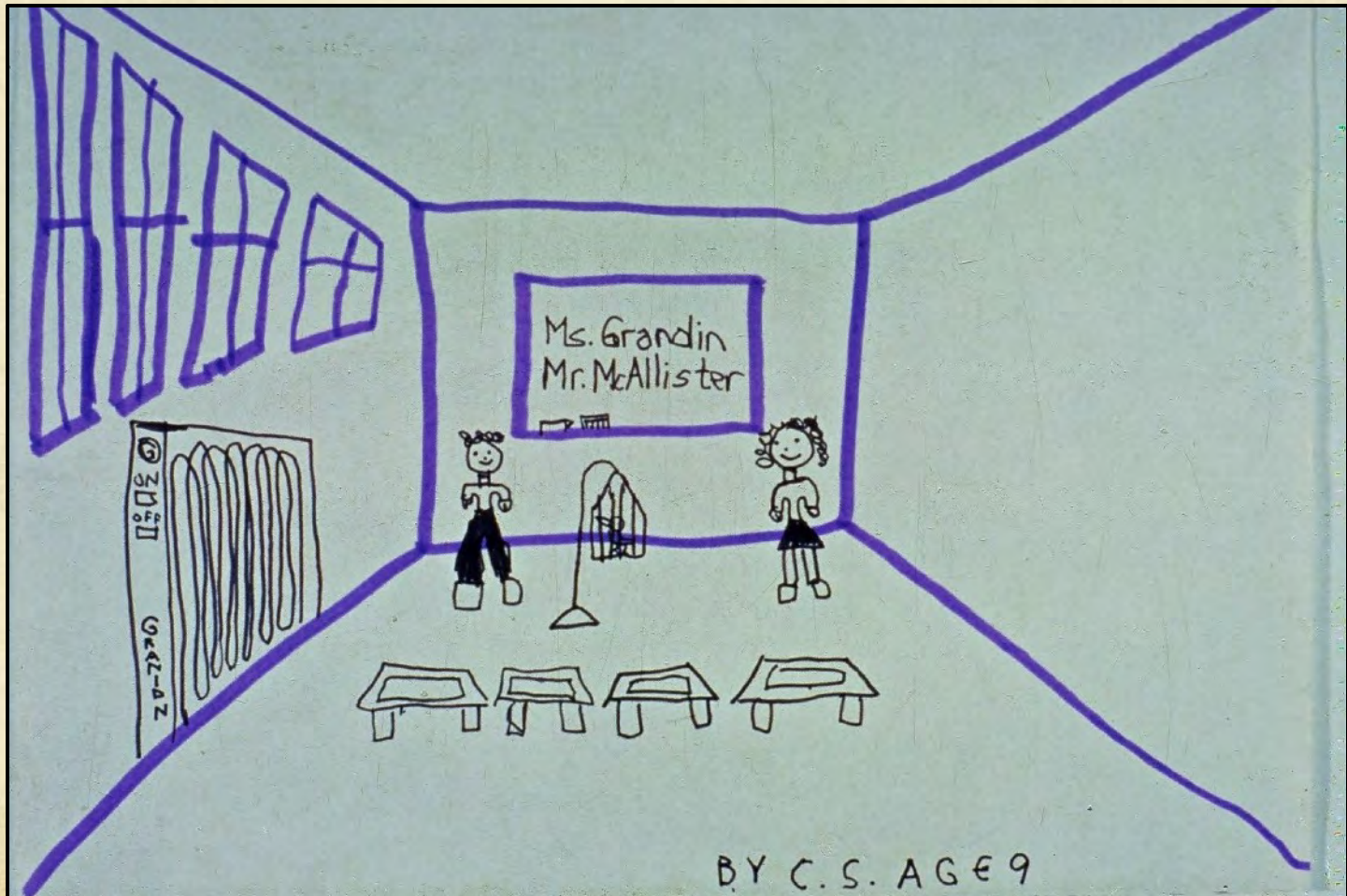


Auditory



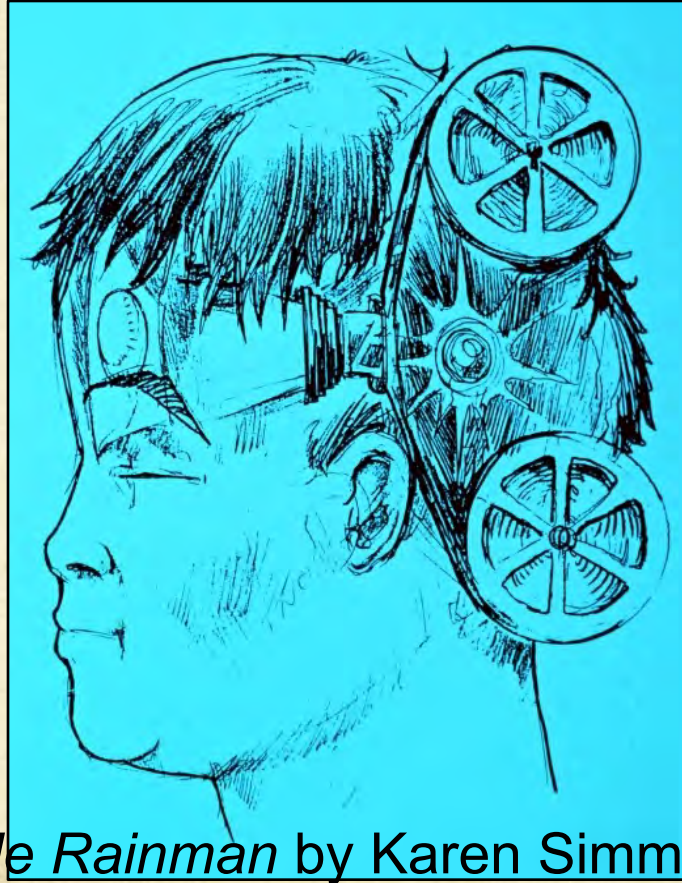
Walt Schneider, Univ. of Pittsburgh

Develop the Child's Strengths



- My ability in art was always encouraged
- Academic skills are uneven
- To reduce behavior problems due to boredom, provide more advanced school work in the child's area of strength

My mind works like Google for Images



Little Rainman by Karen Simmons

Notice Visual Detail - Helpful in Animal Behavior Research



Increased Auditory Capacity

- ✓ Enhanced pitch discrimination
- ✓ Better at detecting unexpected sounds
- ✓ Easily distracted
- ✓ Explains sensory overload

Source: Remington and Fasmler, 2017

Visual Thinking Asset for an Equipment Designer



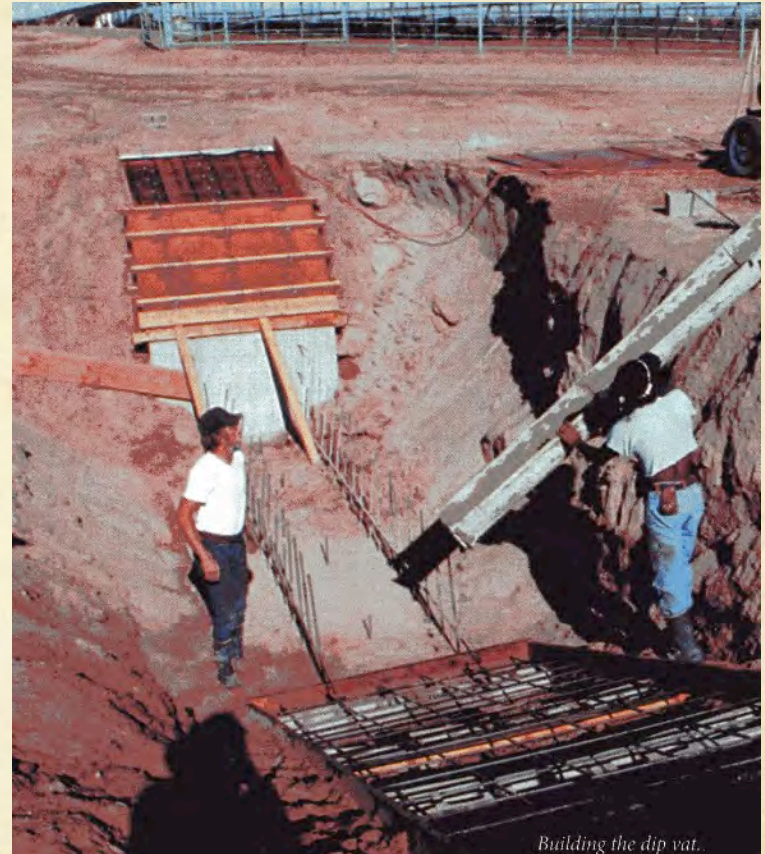
Half the cattle in the U.S. are handled in equipment I have designed



Starting My Career in Construction

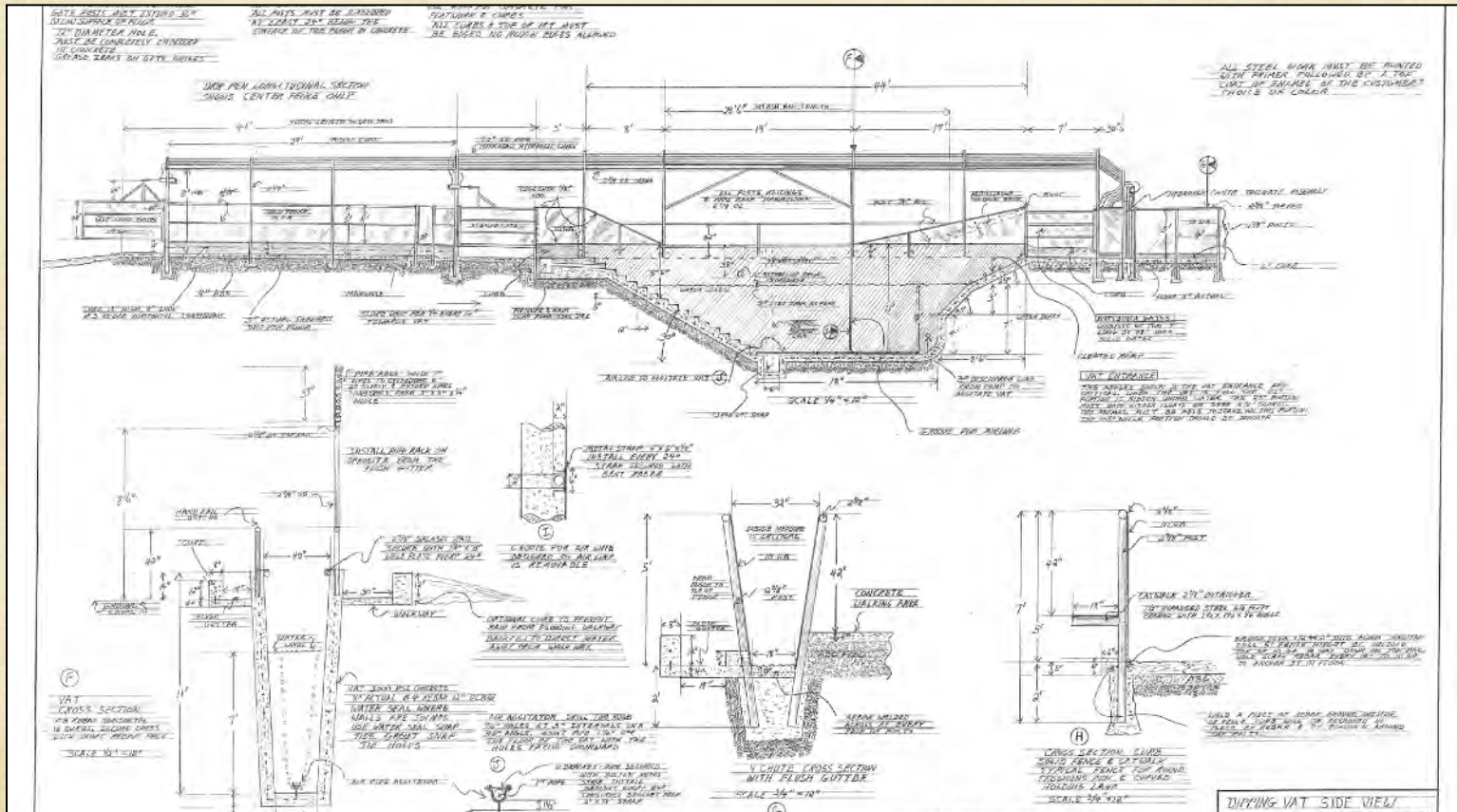


Swift, 1974



McElhaney Cattle, 1976

Sold My Work by Showing My Portfolio



Big Complex Projects for Skilled Trades



Worked with people who had autism or were dyslexic on this type of project



**I realized my thinking was
different when I asked
other people to think
about church steeples**



**Most people see in
their imagination a
generalized generic
steeple**

**I see only specific
pictures of steeples I
have observed**

**They flash into my
memory like a series of
still Googled pictures**

My childhood church

First category under steeples



Local churches in Fort Collins

Secondary category under steeples



Famous Steeples

Mormon Temple, Washington, D.C.
Third category under steeples



Famous Steeples
Old North Church - Boston
Third category under steeples



Famous Steeples Notre Dame



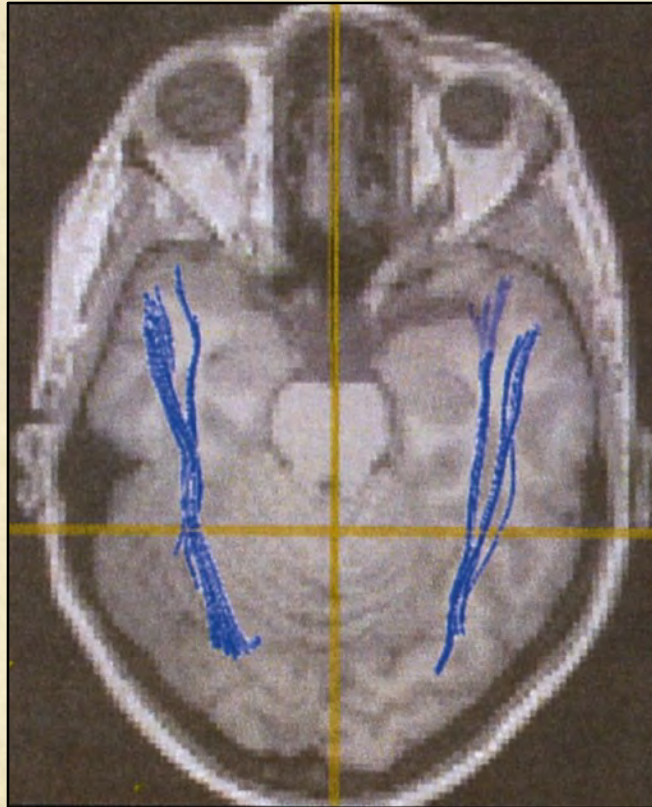
Famous Steeples

Westminster Abbey



Brain Scans

Control



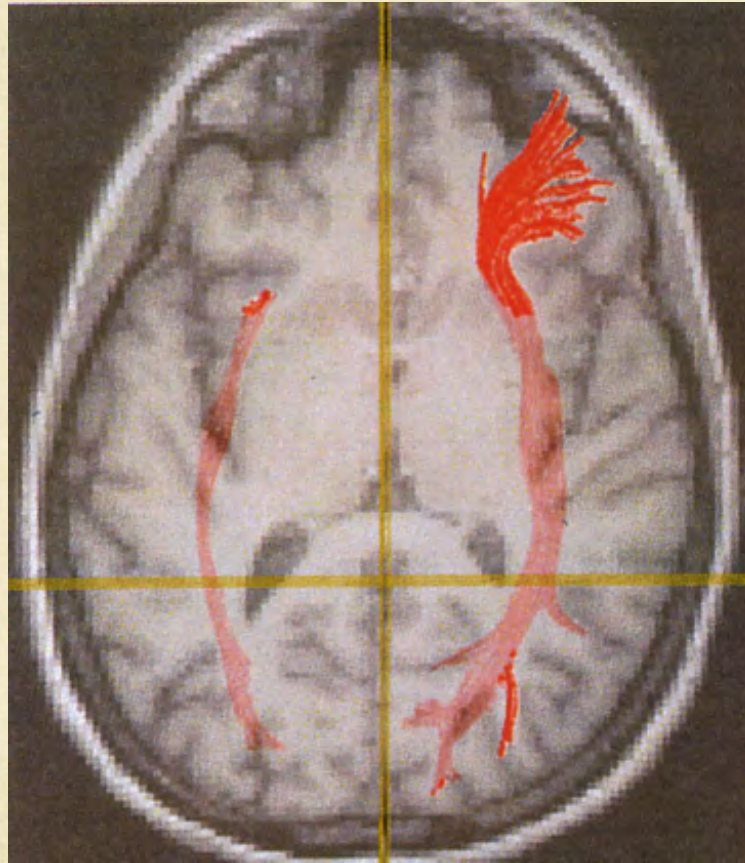
T. Grandin



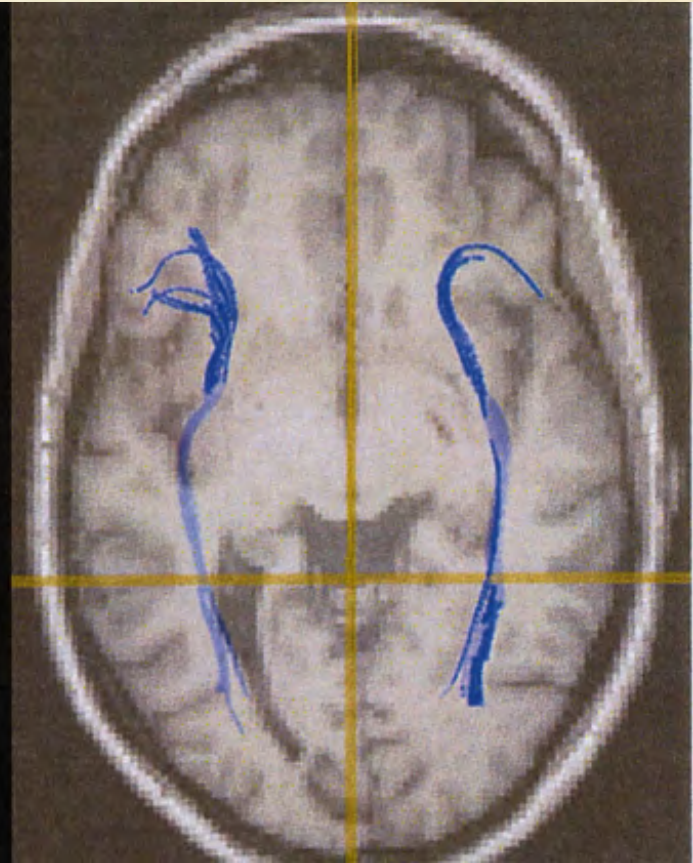
Humphreys, Minshew, Behrmann, and Cibu, 2006

Brain Scans

T. Grandin

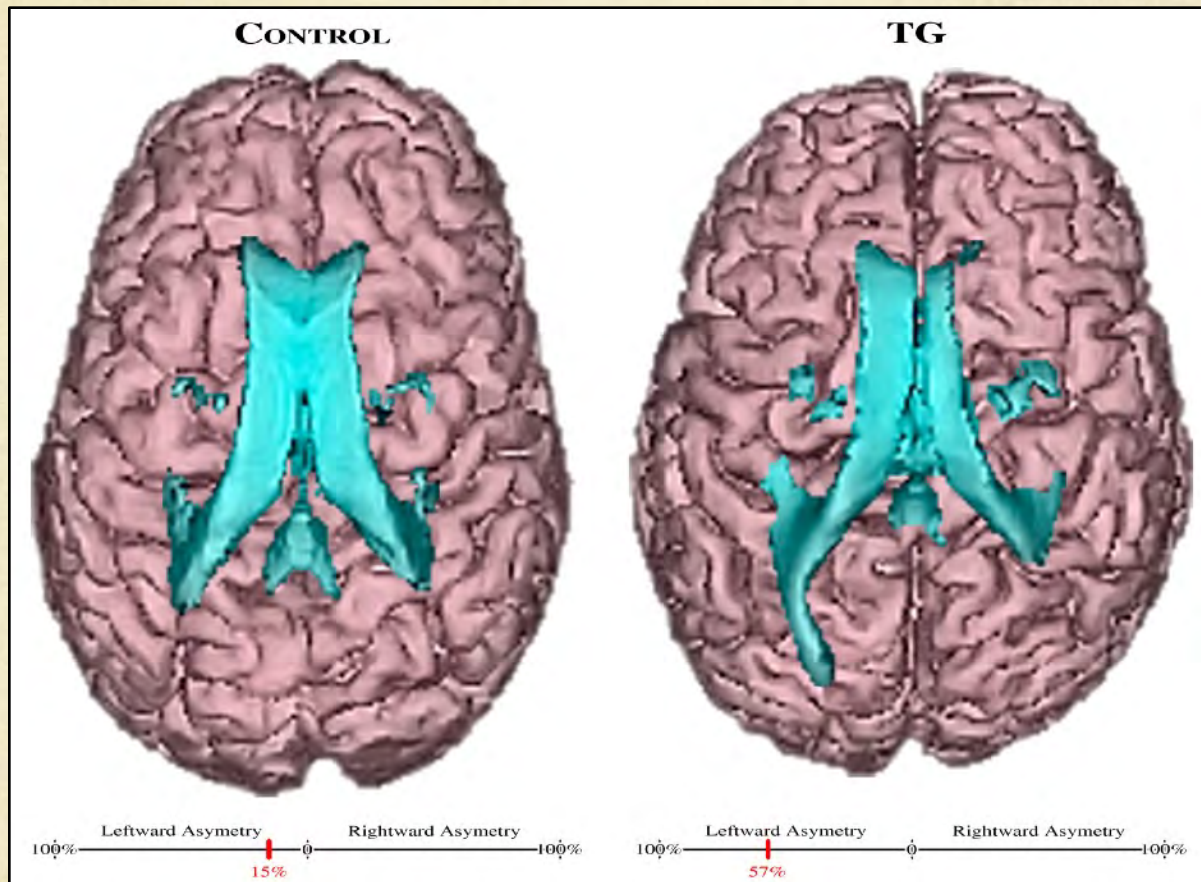


Control



Humphreys, Minshew, Behrmann, and Cibu, 2006

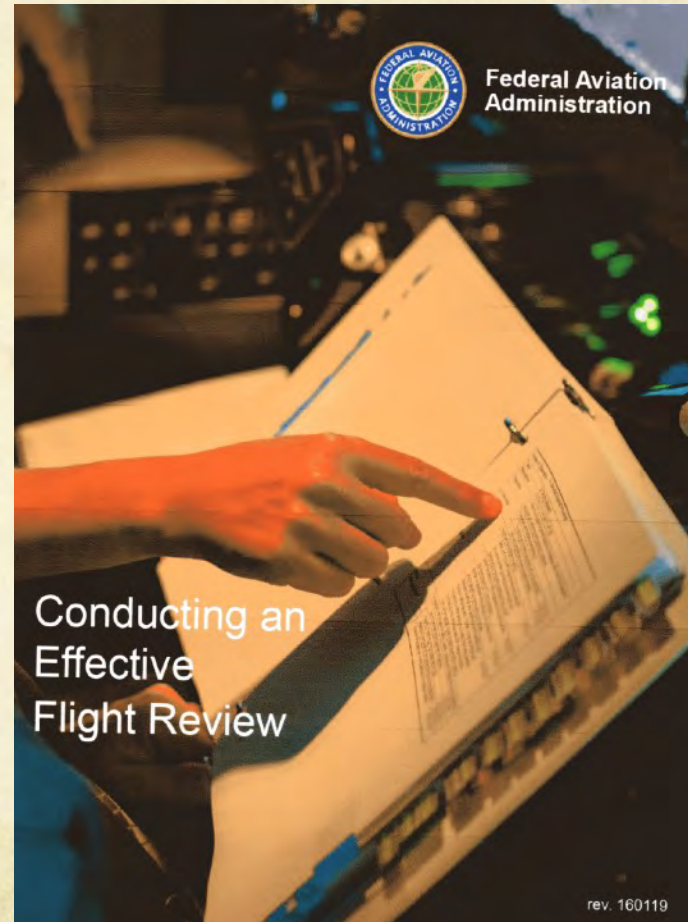
Abnormalities in Left Hemisphere



University of Utah, 2010

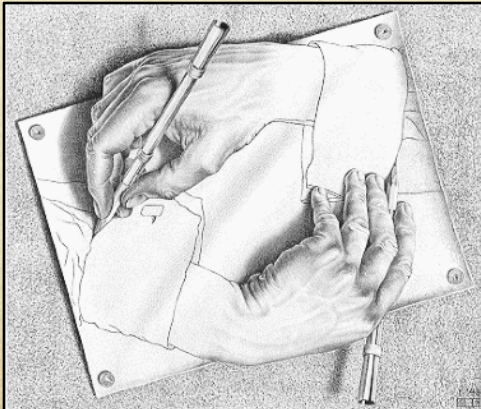
Pilot's Checklist

- ✓ Use for tasks with a sequence of steps
- ✓ Do NOT load working memory



Develop Talents in the Individual's Specialist Brain

1. Photo Realistic Visual Thinking – Poor at algebra
2. Pattern Thinker Music and Math – Poor in reading
3. Verbal Facts Language Translation – Poor at drawing
4. Auditory Thinker – Visual perception fragmented



There can be mixtures of these thinking types

Use a Variety of Teaching Methods

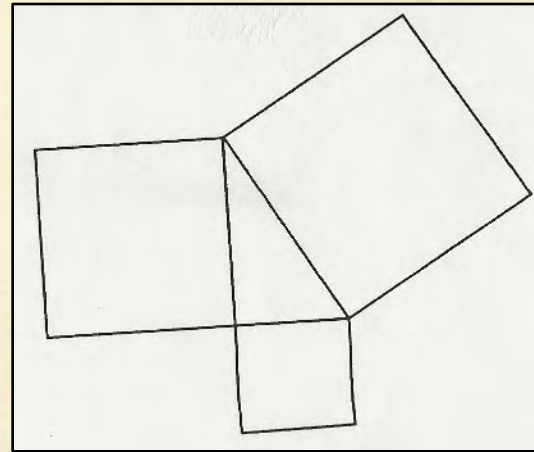
- ❑ Reading: Try phonics or whole word
- ❑ Math: Try the old fashioned methods
- ❑ Some college students were never taught practical math

Two Categories of Mathematicians

Geometers – See this figure

Algebraists

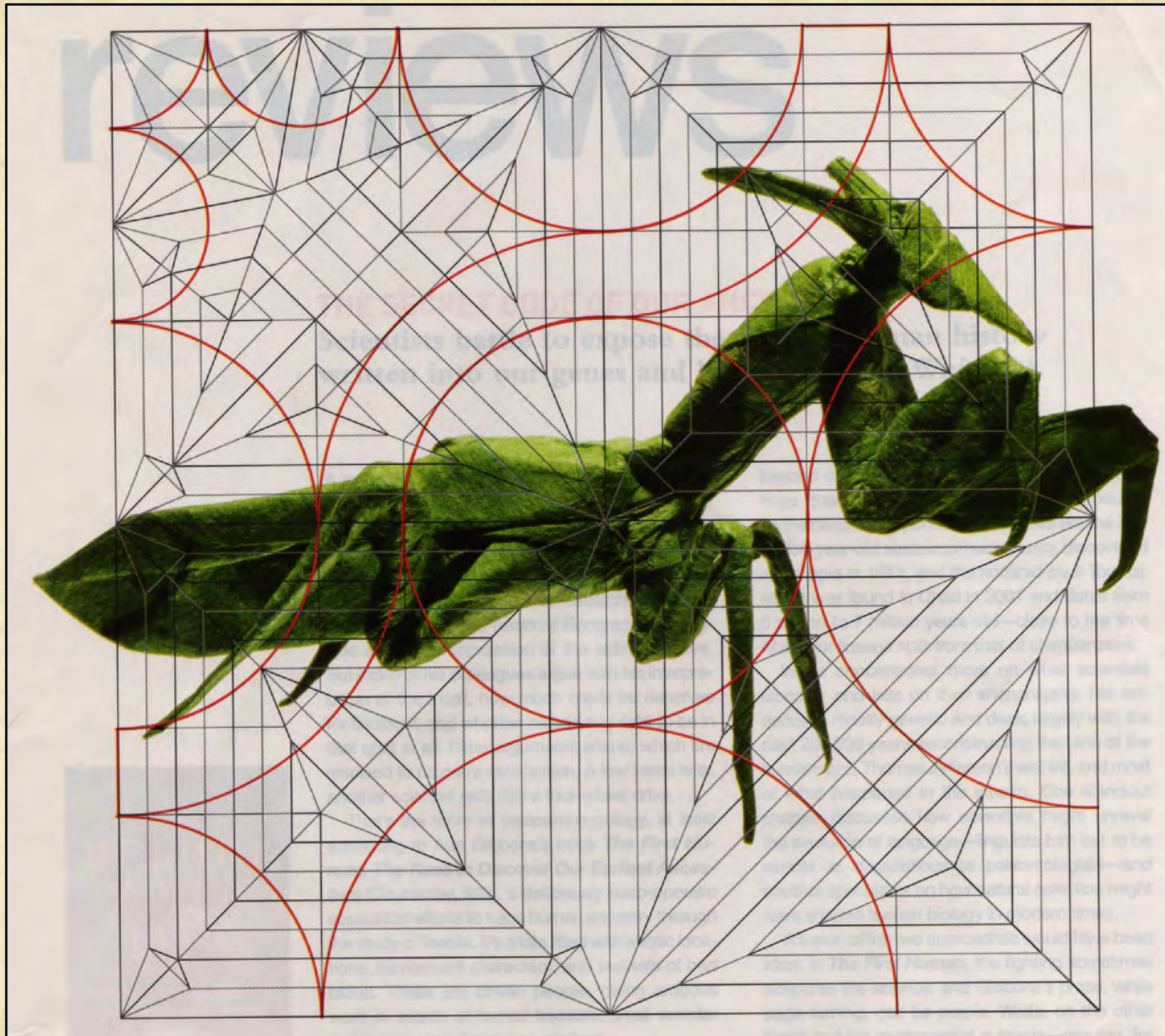
$$a^2 + b^2 = c^2$$



Masha Gessen – Perfect Rigor, 2009

Use Google Image Search for Visual Math Lesson

- ☐ Geometry
- ☐ Trigonometry
- ☐ Calculus
- ☐ Origami golden ratio
- ☐ Fractals
- ☐ Symmetry



Robert Lang, 2006



Hands-on Activities Taught Practical Problem Solving Skills



I learned from my mistakes

**Some teenagers today do
not know how to connect
a garden hose**





- All my thinking uses specific examples to create concepts
- It is bottom up thinking and not top down thinking
- I learned ALL concepts using specific examples put into categories

**Sensory thinkers sort specific
pictures, sounds, touches, and**



Little Rainman by Karen Simmons

Bullies Called Me Tape Recorder



Is autistic learning just memorization? It is memorization and scripting, but as more information is memorized, it can be assembled into more and more categories which will help thinking to become more flexible.

Teach Number Concept Generalization

- Count a variety of different kinds of objects
- Addition and Subtraction - Teach with many objects
- Fractions – Teach by cutting up fruit and paper circles

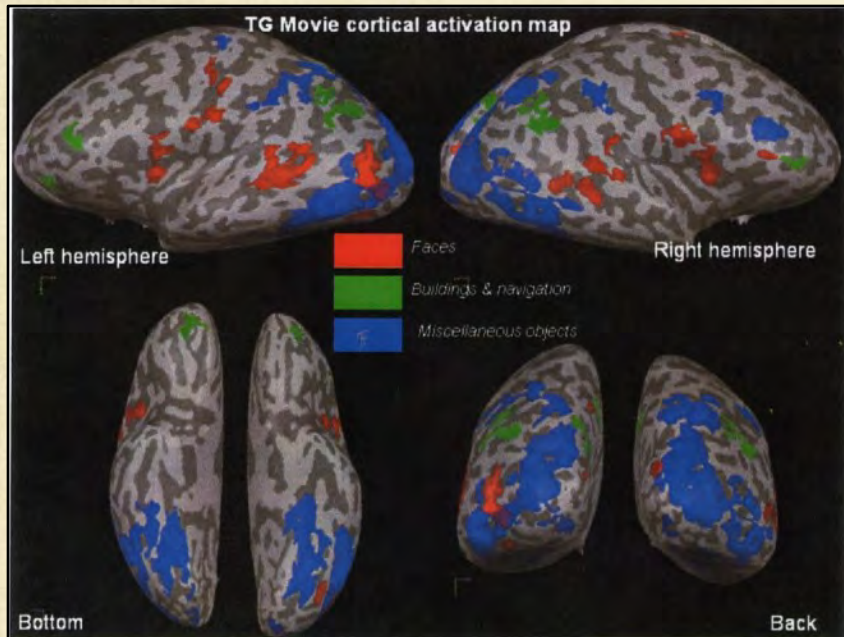


Teach “Position” Words with Several Specific Examples

- Walk down the stairs
- A plane goes down and lands
- Put a cup down
- Lie down on the bed

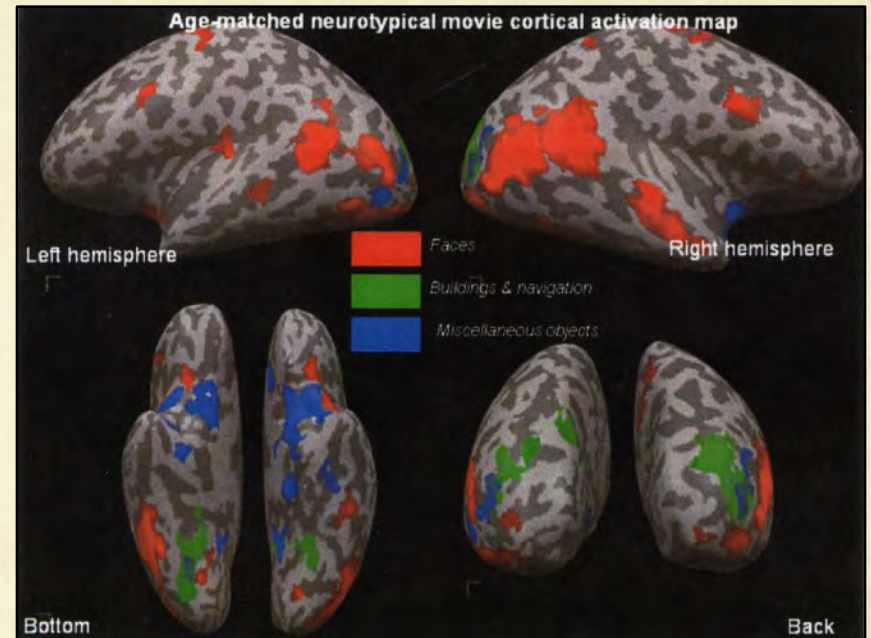
Objects are More Interesting than Faces

T. Grandin



Blue = objects

Control



Red = faces

Humphreys, Minshew, Behrmann, and Cibu, 2006

Make Friends Through Shared Special Interests

- School Clubs and Activities
- Organizations such as Scouting, FFA and 4-H
- Maker Community Groups
- Careers
- Classes that really interest an individual



My 1950's upbringing taught me many important social and job skills. Everything was learned by categorizing specific examples into these concepts:

- ❑ Turn taking in conversation and activities – such as board games
- ❑ Being on time
- ❑ Doing family activities I disliked
- ❑ Party hostess at family parties
- ❑ Saying *please* and *thank you*

-
- Parents and teachers must work together as a team
 - The Rules should be the same at home and school and be consistently enforced
-

Teaching Social Skills is Like Training a Person How to Behave in a Foreign Country

- ☐ Shaking hands
- ☐ Eye contact when meeting people
- ☐ Ordering food in restaurants
- ☐ Table manners
- ☐ Shopping – Talking to store staff
- ☐ Doing household chores that benefit the entire family

- **Eccentric is acceptable; being dirty and rude is not.**
- **Do not try to de-geek the geek!**



Photo Credit - Reuters

NASA Space Scientist Cries When the Shuttle Was Cancelled



It's ok for Geeks to cry!

Rule System

1. Really bad things
2. Courtesy rules
3. Illegal, but not bad
4. Sins of the system

Need to Teach Values for a Good Life

- ✓ Golden Rule – Teach one specific example at a time
- ✓ Teach the importance of controlling anger and making the world a better place
- ✓ Media in 1950's taught good values



The squeeze machine helped reduce anxiety and panic attacks

University of Utah, 2010

Things I was Afraid of in My 20's

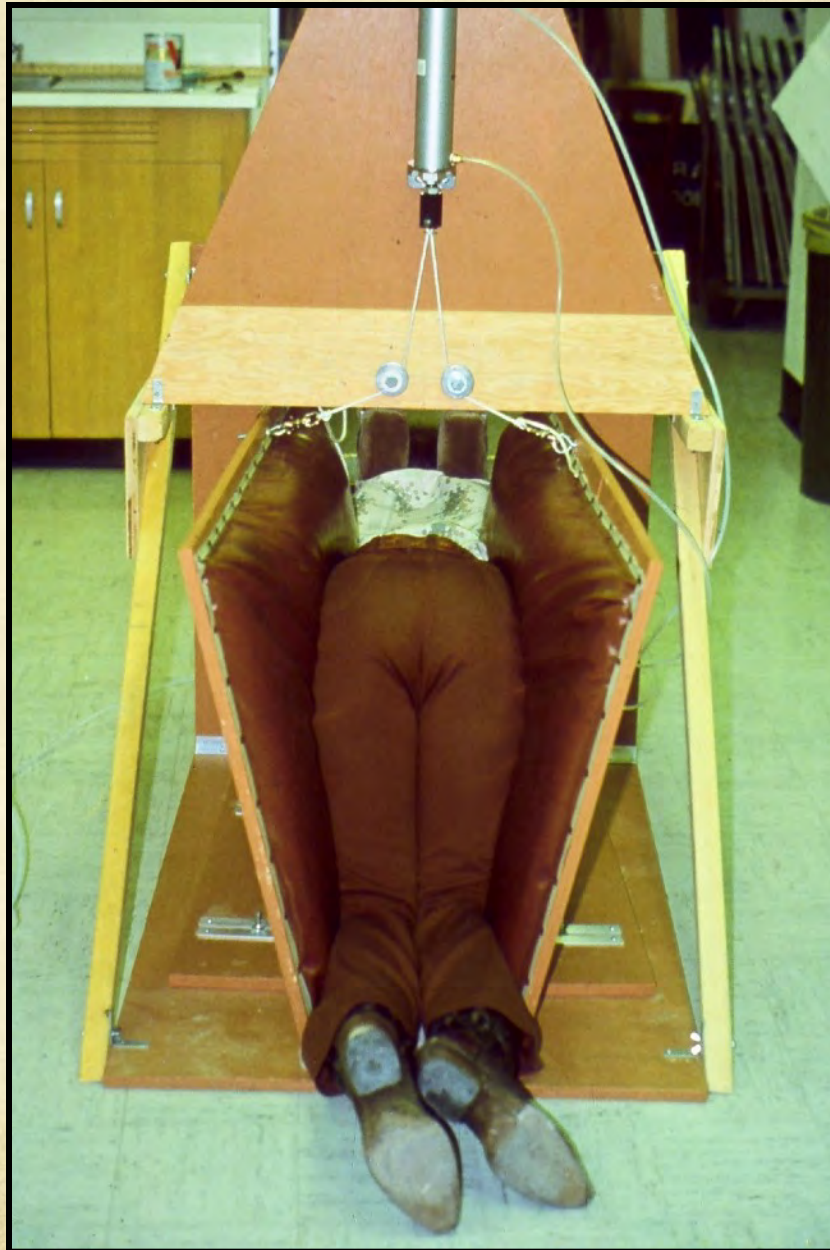
- ✓ Airplanes
- ✓ Public speaking – walked out during my first talk



Got Over It When an Airplane Became Interesting



- Fear is the main emotion in autism. My amygdala (fear center) is three times larger (University of Utah, 2010)
- A low doses of antidepressant has controlled my anxiety – Started early 30's
- *Thinking in Pictures* – Chapter “A Believer in Biochemistry”
- High doses of antidepressants may cause insomnia or agitation



Using pressure to calm the nervous system during therapy



**Sometimes speech is easier
when the child is swinging**



Sitting on a ball and wearing a weighted vest helps concentration. Use for 20 minutes then take off for 20 minutes.



It is important to desensitize touch sensitive autistic children so that they will enjoy affection. Feeling the good feelings of being held helps to develop feelings of kindness.



My Elementary School Life Skills Training

- ☐ Party hostess at family parties and shake hands with guests
- ☐ Sold candy to neighbors for charity
- ☐ Shopped by myself for small toys and snacks

My Work Experience

- ❑ 13 years of age - Sewing job
- ❑ 15 years of age – Cleaning horse stalls
- ❑ 16 years of age – Aunt's ranch
- ❑ 16 years of age – Roofing
- ❑ 17 years of age – Sign painting
- ❑ College – Research Lab – Rent houses

I was a poor student but I learned lots of valuable work skills in high school. I did building projects that other people appreciated

Before



After



Freelance Sign Painting at the Carnival



Photo by Leo

Sign Painting Business



Scheduled Tasks Outside the Home to Teach Work Skills to Both Children and Adults

- ☐ Walking dogs for the neighbors
- ☐ Maintaining computers
- ☐ Selling artwork or crafts
- ☐ Volunteer jobs at a church or community center
- ☐ Working in a farmer's market
- ☐ Volunteer at Animal Shelter or Pet Store

The LEGO Mindstorms NXT 2.0 Discovery Book



Kids good at Legos
need to progress to
using hand tools

www.discovery.laurensvalk.com

This architectural drawing provides a detailed view of the interior of the Pantheon in Rome. The central feature is the large, circular nave, which is covered by a massive coffered dome. The dome's structure is meticulously detailed, showing the arrangement of the coffers and the central oculus. The nave is flanked by a series of niches, each containing a statue. The entrance to the temple is through a portico supported by a row of Corinthian columns. The drawing includes numerous annotations and dimensions, such as 'DOME COFFERS', 'NICHE', 'COLUMN', and various measurements in feet and inches. The overall style is that of a technical architectural plan, with clear lines and detailed shading to represent the three-dimensional space.

Sell Yourself with a Portfolio

✓ Put it on your
phone

✓ 30 second
WOW

LIVESTOCK HANDLING SYSTEMS

A Well Designed Facility will help make your
Livestock Operation More Profitable.



CUSTOM DESIGNED To Fit Your Operation:

Working, sorting, loading and hospital facility at A. Glenn Klack Feedlots in Richland, Nebraska. The system has a curved level loading chute, herringbone sorting pens, scale, covered hospital pens, working circle and horse pens. Curved chutes and smooth traffic flow reduce stress and improve efficiency. The covered working circle is designed for easy washdown. Employees will do a better job of processing in clean facilities which protect them from the weather. Careful gentle processing will improve cattle performance.

CURVED WORKING CHUTES For Greater Efficiency:

A curved single file chute, round crowding pen and wide curved alley are labor saving and reduce stress at Alan Verishine's cow calf operation in Saskatoon, Canada. A handler working from the catwalk along the inner radius can move cattle easily into the round crowd pen and squeeze. Cattle can be sorted 3 ways after the squeeze chute. Grandin designs handling facilities for all types of ranch and feedlot operations.



Consultant & Designer of livestock handling facilities for feed lots, ranches, packing plants & auctions.

GRANDIN LIVESTOCK HANDLING SYSTEMS, INC.

Office 3, 1401 Silver St.
Urbana, IL 61801 217-384-4815

NEW ADDRESS:

2918 Silver Plume Dr. # C-3
Fort Collins, CO 80526

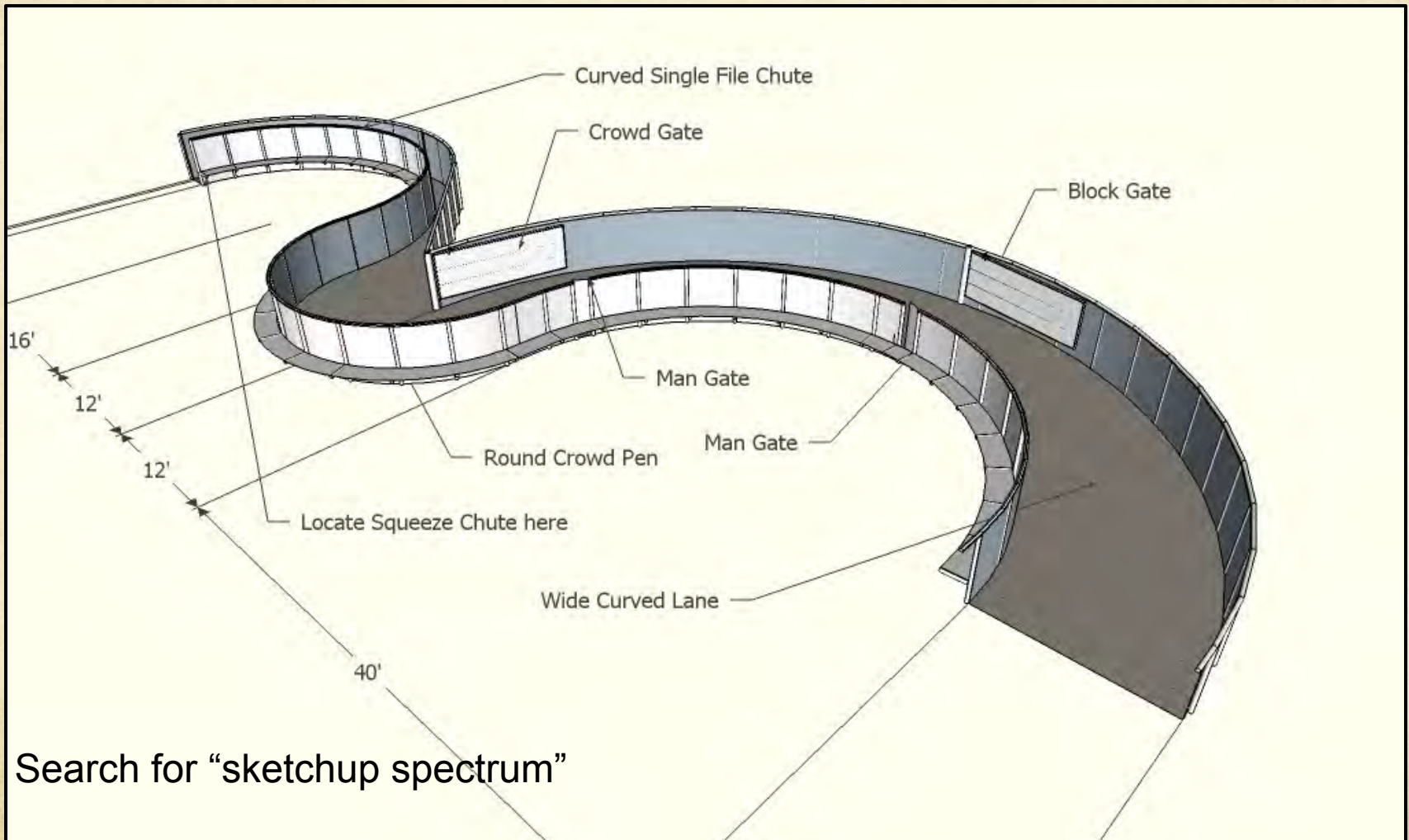
Cattle move easily through the wide curved lane to the crowd pen



Half the Cattle in North America are Handled in Systems I Designed



My Design in 3D Drawing Software SketchUp



Free College Courses

- ☐ U.S. National Science Digital Library Project
- ☐ Khanacademy.org
- ☐ Code Academy
- ☐ Udacity.com
- ☐ EdX Free courses – Stanford and MIT
- ☐ Physics Education Technology PhET
- ☐ Coursera
- ☐ Wolfram Mathematica
- ☐ Code.org

Show Kids Interesting Things



Put business and science magazines in the school library

**The Guys Have Fun with
Stuffy the Mechanical Cow
on the HBO Movie Site**





Avoid Interviews
Find the Back Door



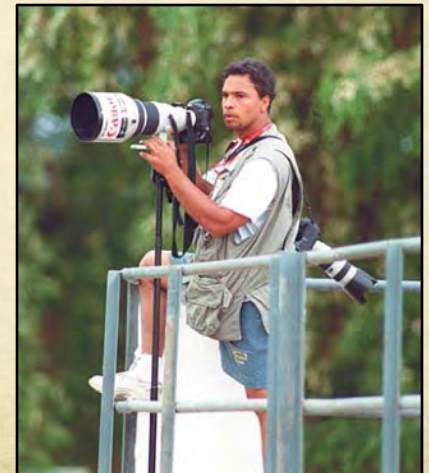
I was wearing my portfolio.
People respect ability.

Finding Mentors and Teachers

- ☐ My Mother
- ☐ Elementary School Teachers
- ☐ Mr. Carlock High School Science Teacher
- ☐ Aunt Ann on the Ranch
- ☐ Jim Uhl – Agate Construction

Jobs for Visual Thinkers

- Industrial design
- Computer network specialist
- Graphic arts
- Drafting
- Auto mechanic
- Computer repair
- Handcrafts
- Convention AV technician
- Photographer
- Animal trainer
- Architect
- Veterinary technician



Jobs for Music and Math Thinkers

Math teacher

Scientific researcher

Electronics technician

Music teacher

Chemist



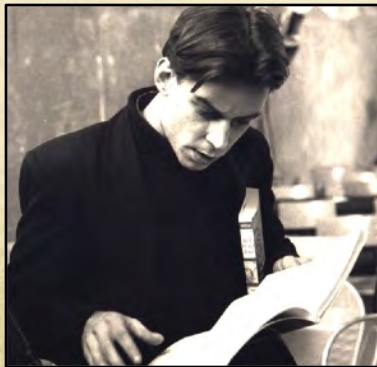
Computer programmer

Engineer

Physicist

Musician/composer

Statistician



Jobs for Verbal Thinkers

Stocks and bonds analyst

Journalist

Translator

Librarian

Copy editor

Accountant

Specialty Retail

Bookkeeper & record keeper

Budget analyst

Special education teacher

Book indexer

Speech therapist

Inventory control specialist

Legal researcher

Stage actor



Jobs for People with Poor Verbal Skills or Non-Verbal

Shelve Library Books

Factory Assembly Work

Fast Food Restaurant Work

Running Copies and Mail Room

Lawn and Garden Work

Recycling Plant/Warehouse

Stocking Shelves

Inventory Control

Handcrafts



Evaluation of Treatments

- ☐ Risk versus Benefit –
Too many drugs given to
young children
- ☐ Cost versus Benefit
- ☐ Evidence of
Effectiveness

Principles of Using Medication

- ✓ Try one thing at a time
- ✓ A medication should have an obvious beneficial effect
- ✓ Withdraw a medication slowly, if a person has been on it a long time
- ✓ Be careful switching brands
- ✓ Don't expect 100% control of a symptom

Do Not Overgeneralize When Troubleshooting Behavior Problems

Is it **biological**?

- Sensory over sensitivity
- Hidden painful medical problem
- Difficulty processing rapid information
- Cannot remember long strings of verbal instruction

Is it **behavioral**?

- Frustration because cannot communicate
- Get attention
- Escape from a task

Hidden Painful Medical Problems in Non-Verbal Individuals That Can Cause SEVERE Behavior Problems

- Acid Reflux heartburn (most common). Not always obvious.
- Constipation
- Urinary tract infection
- Yeast infection
- Ear infection
- Bad tooth
- H pylori (stomach, ulcer bug)

The

*Foreword by
Dr Temple Grandin*

Parent's Guide

to the



Medical World of Autism

*A Physician
Explains
Diagnosis,
Medications
&
Treatments*

Edward Aull, MD
Behavioral Pediatrician

HOPE FOR THE VIOLENTLY AGGRESSIVE CHILD

NEW DIAGNOSES AND TREATMENTS THAT WORK

Dr. Ralph Ankenman

*"Once I started reading this book, I could not put it down!
Every clinic and school should have this as a reference."*

— Temple Grandin, PhD



Special diets work for some individuals



Vitamins and supplements B6 and Magnesium



Vigorous exercise for calming



Weighted blanket or vest for calming



Omega 3 supplements help the brain



Poor diet – more depression

SSRI'S Antidepressants

Work really well for anxiety and panic attacks



Prozac

(fluoxetine)



Zoloft

(sertraline)



Celexa

(citalopram)



Lexapro

(escitalopram)



Paxil

(paroxetine)



Atypical Anti-Psychotics

May have severe side effects



Risperdal (risperidone)

Geodon (ziprasidone)



Zyprexa (olanzapine)

Abilify (aripiprazole)



Seroquel (quetiapine)



Low Dose Principle

Some individuals on the autism spectrum need only $\frac{1}{4}$ to $\frac{1}{2}$ of the normal starting dose of drugs in these 3 classes:

- SSRI Antidepressants
- Tricyclic Antidepressants
- Atypical Antipsychotics



Too much causes insomnia, agitation and irritability. Other drugs usually require normal doses. If used in small children, micro doses – $\frac{1}{10}$ of mg of Risperdal.

Blood Pressure Medications Reduce Anxiety and Are Used as Sleep Aids

Much Safer than Atypicals

☐ **Beta blocker propranolol**

☐ **Clonidine**

Anti-Convulsant Drugs for Aggression and Mood Stabilization

- ☐ Depakote
- ☐ Lamitel (lamotrigine)
- ☐ Topamax (topiramate)

ADHD Drugs and Autism

- Stimulants tend to make classical autism worse
- Stimulants sometimes help individuals with mild Asperger's

Look Up All Drug Interactions

- Prescription drugs
- Non-prescription drugs
- Herbal supplements

Traits in Close Relatives

Four Generations of Bankers

MIT-Trained Engineer/Co-Inventor Auto Pilot

Anxiety

Depression

Visual Thinking Skills – Artist, Home Decorators

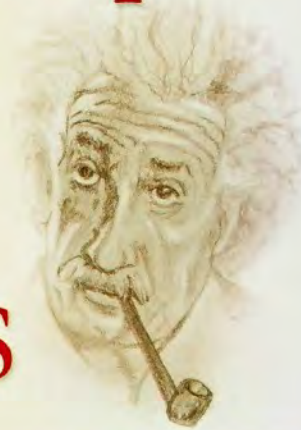
Food Allergies

Intellectual Giftedness – Writing English Literature

Asperger Traits

Asperger's and Self-Esteem

Insight and Hope
Through
Famous
Role Models



Norm Ledgin

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<http://www.equinescience.colostate.edu>

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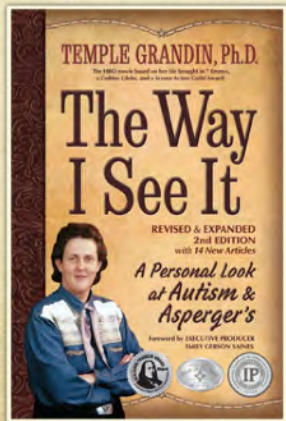
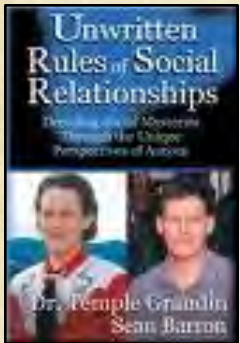
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