

# Autism and Theory of Mind

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# Autism

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Developmental  
disorder

History

Diagnosis

Characteristics

Varying  
theories

Theory of Mind

Fusiform Face  
Area

Oxytocin



# Developmental Disorder

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**INTERRUPTION OF TYPICAL  
DEVELOPMENT DURING  
CHILDHOOD**



**INTERFERES WITH THE  
ACQUISITION, RETENTION, OR  
APPLICATION OF SPECIFIC SKILLS**



**RESULTS IN SUBSTANTIAL  
FUNCTIONAL LIMITATIONS IN  
MAJOR LIFE ACTIVITY**



# History

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## Leo Kanner (1943)

- “Father of Child Psychiatry”
- First to publish clinical account of Autism
- “Refrigerator Mother”

## Hans Asperger (1944)

- First to publish definition of Asperger’s syndrome
- “Autistic Psychopathy”
- “Little professors”



# History



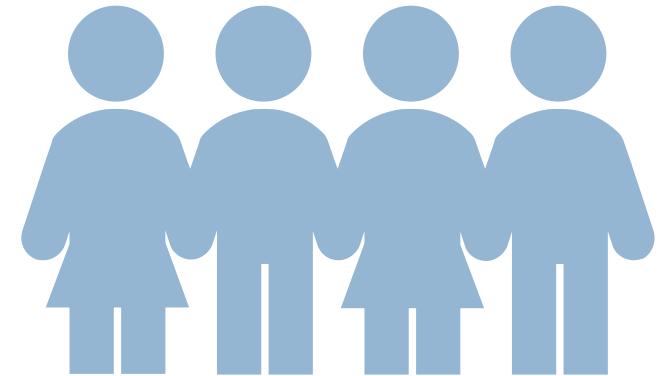
## Uta Frith

- Neurocognitive approach to developmental disorders
- Autism, Asperger's, and Theory of Mind
- Major shift in societal perception of Autism
  - Environmental → Biological
  - Introduction of “high-functioning Autism”

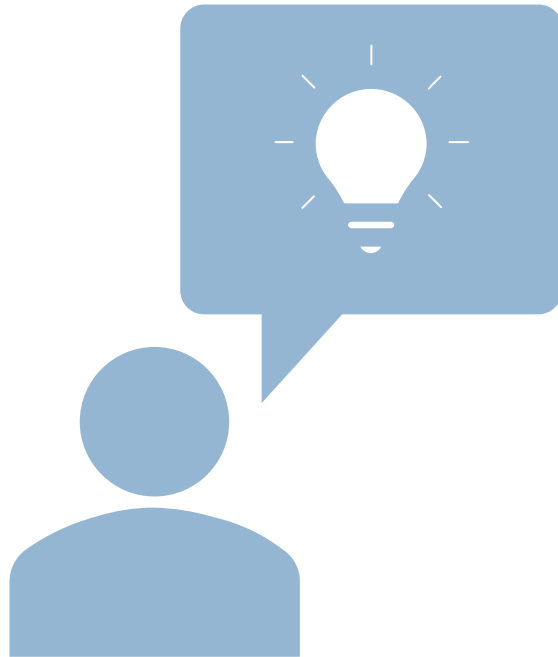


# Demographics

- 4:1 M:F ratio
- Approximately 1% of the US population
  - 15% increase from 2016 to 2018
  - 1 in 59 children diagnosed
- Commonly diagnosed after age 4
  - Can be reliably diagnosed after age 2 (per CDC)
- Co-morbidity rates increased
- Prevalence in marginalized communities increased





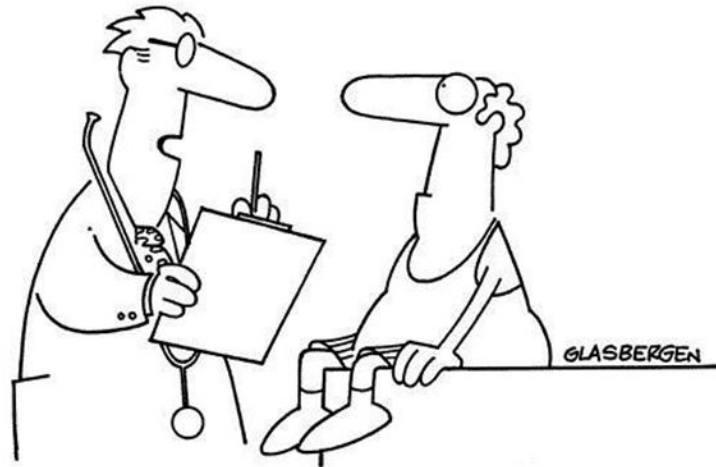


# DSM

## Diagnostic and Statistical Manual of Mental Disorders

- Descriptions, symptoms, and criteria
- Currently 297 disorders listed
- DSM 5 - 2013





**“We can’t find anything wrong with you, so we’re going to treat you for Symptom Deficit Disorder.”**

# DSM





# **DSM IV – other disorders associated with autism**

## **Pervasive Development Disorders**

- **Autistic Disorder**
- **Asperger's Syndrome**
- **Childhood Disintegrative Disorder**
- **Rett's Disorder**
- **Pervasive Development Disorder Not Otherwise Specified (PDD-NOS)**



# DSM IV vs. DSM 5



4 PDDs reclassified as Autism Spectrum Disorder (ASD)

Autistic Disorder  
Asperger's Syndrome  
CDD  
PDD-NOS



Addition of sensory issues as symptom



Severity assessment scale 1-3



Creation of Social Communication Disorder





Deficits in social communication and social interaction



Restricted, repetitive patterns of behavior, interests, or activities



Symptoms present during early development



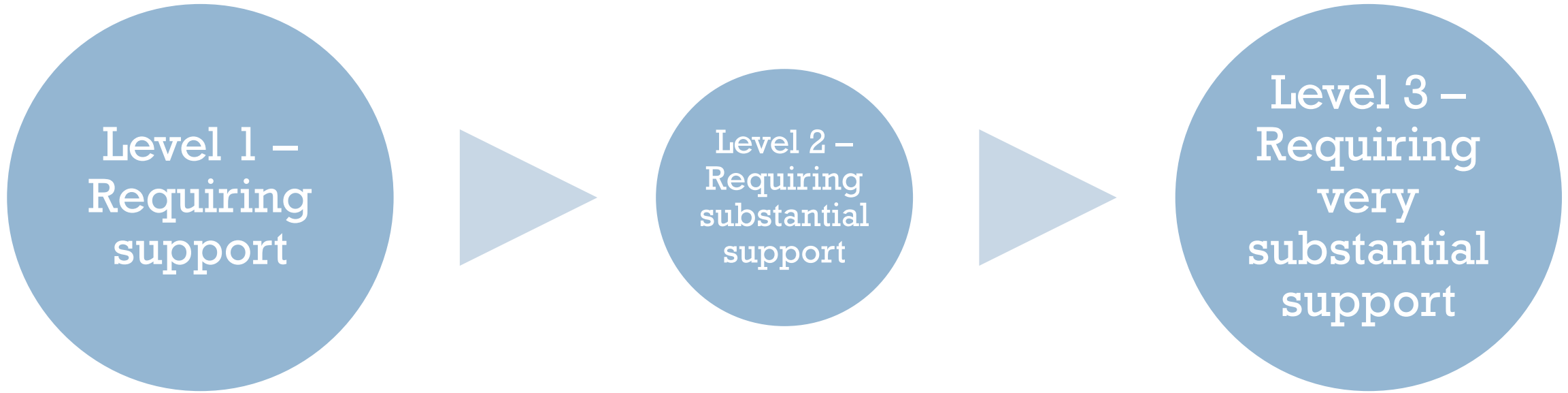
Symptoms cause clinically significant impairment in social, occupational, or other areas of functioning



Not better explained by Intellectual Developmental Disorder or Global Developmental Delay

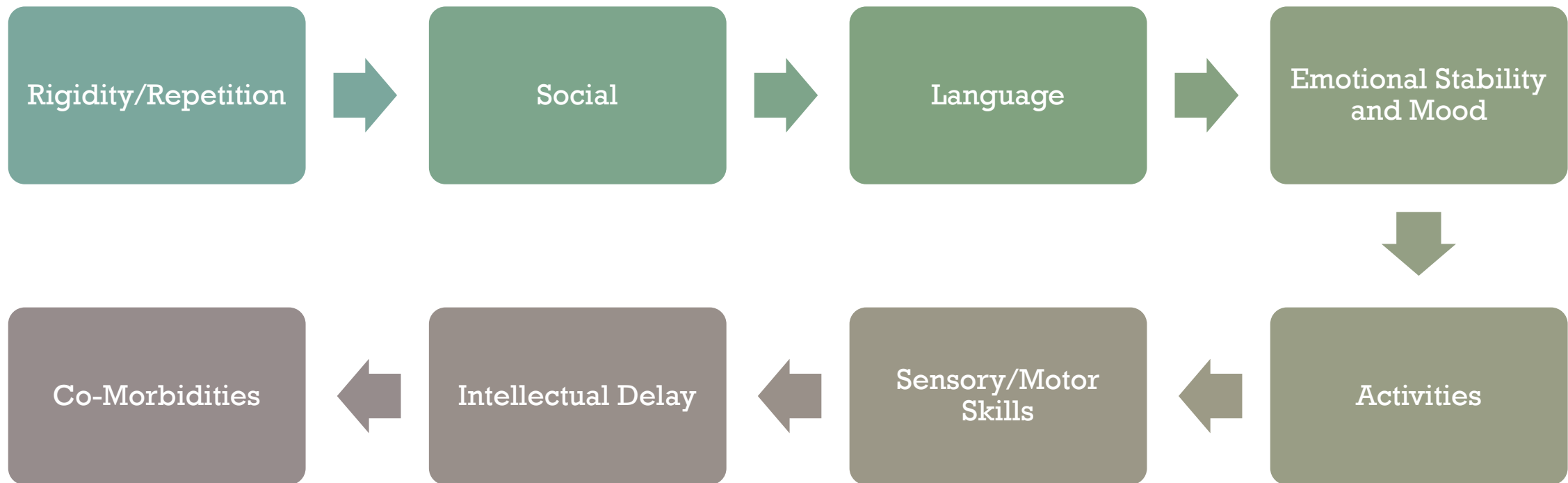
# DSM 5 Diagnostic Criteria - ASD





# **DSM 5 Severity Levels**





# Characteristics





# Characteristics – Rigidity/Repetition

Strict adherence to schedule

- Resistance to change

Emotional changes when schedule changes

- Violent outbursts, tantrums

Repetitive behaviors

- Ex. Touching the same objects repeatedly, making the same gestures

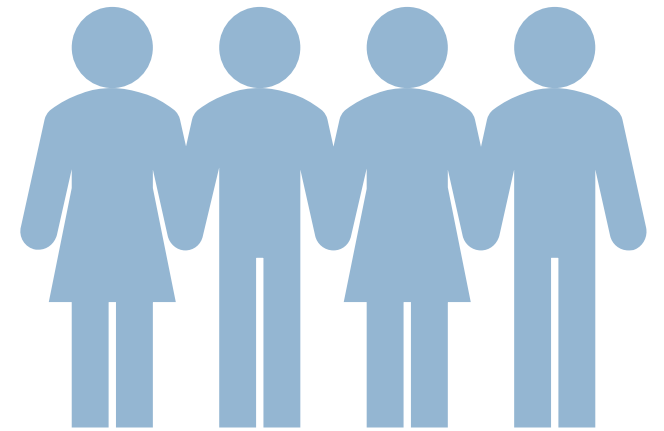
Obsessive behaviors

- with areas of interest



# Characteristics - Social

- Avoids social interactions
  - Often alone
  - Physical distance
- Avoids eye contact
- Poor social attachments
- Avoids touch
- Difficulty recognizing other people's feelings



# Characteristics - Language

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Echolalia

Gestures over  
words

Limited  
vocabulary  
(often with a  
delay)

Difficulty  
expressing  
needs

Stutter



# Characteristics – Emotional Stability and Mood

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EMOTIONAL DISTANCE



LIMITED SENSE OF  
FEAR/DANGER (IF ANY)



HYPER-/HYPO-  
SENSITIVITY TO PAIN





Unorthodox  
teaching methods

Stimming

Hyper-/Hypo-  
fixation

**Characteristics - Activities**





Over-/Under-  
stimulation

Gross and Fine  
Motor skill  
imbalance

Gross – jumping,  
walking, running

Fine – throwing a  
ball, writing,  
using scissors

# Characteristics – Sensory/Motor Skills



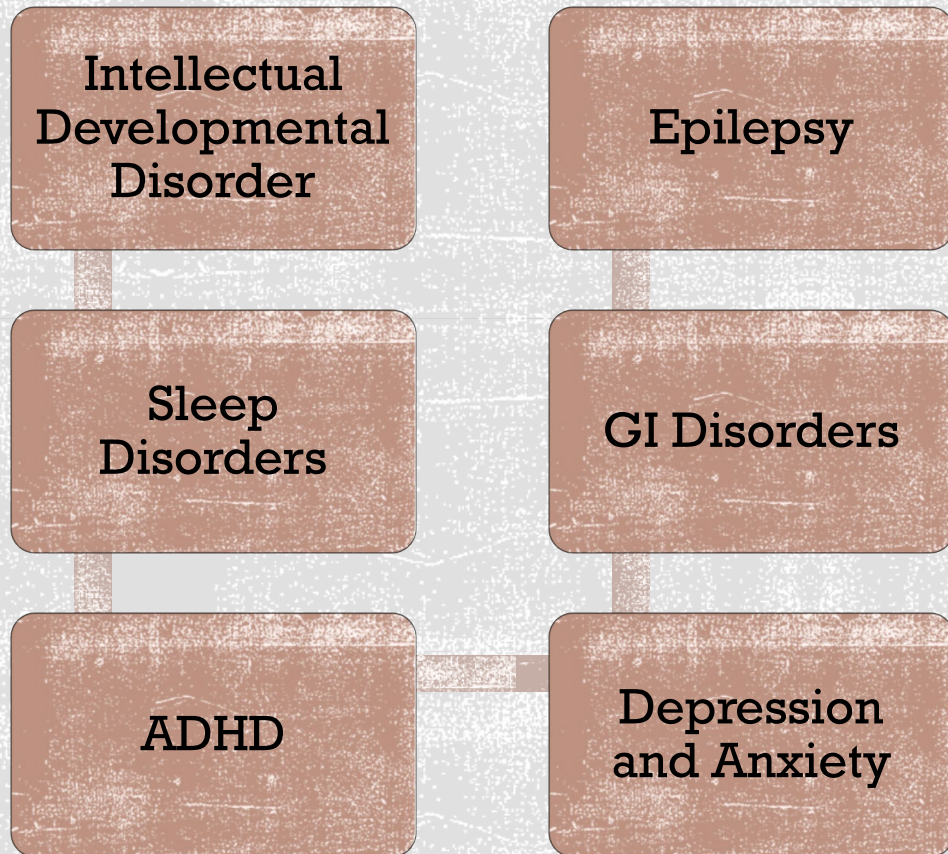
# Characteristics - Intellectual Delay

- Poor verbal ability
- Low IQ score
- “Mental age”
  - Reading, writing abilities and math skills often compromised
- Savant Syndrome
- <https://www.youtube.com/watch?v=xpqilvSNYao>





# Characteristics – Co-Morbidities



# The “Refrigerator Mother” and “Autistic Psychopathy”

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## The “Refrigerator Mother”

- Leo Kanner
- Autism was caused by maternal coldness toward their children
- Children with Autism in turn did not reciprocate love or affection

## “Autistic Psychopathy”

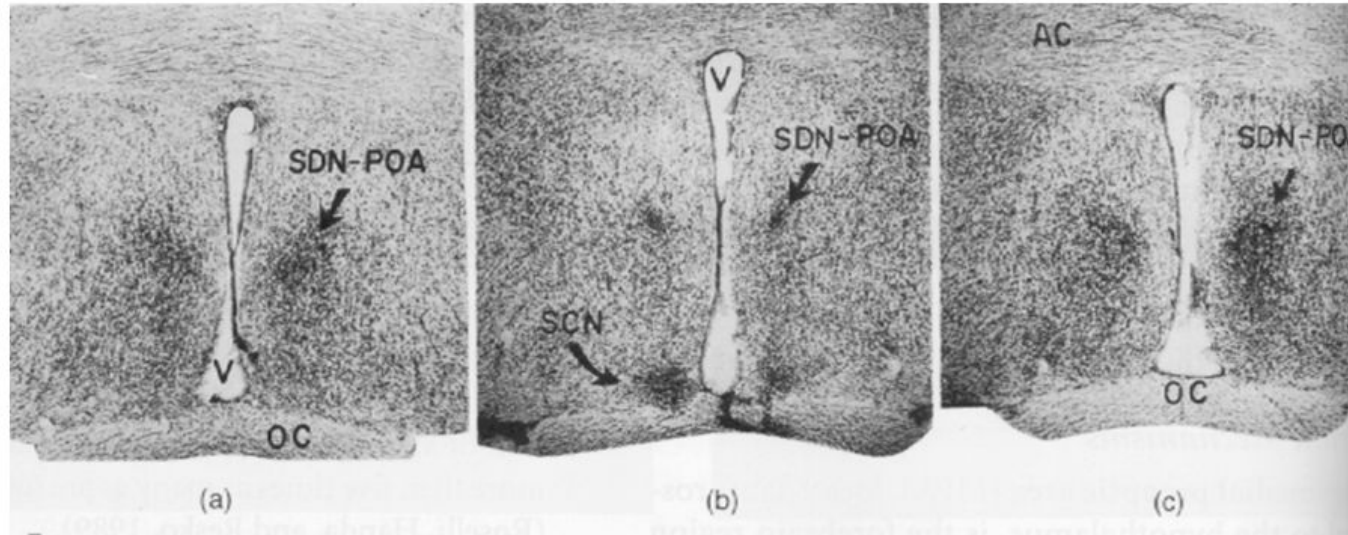
- Hans Asperger
- Lack of empathy
- Little ability to form friendships
- One-sided conversations (self-obsessed)
- Intense absorption in a special interest



# Sexually Dimorphic Nucleus

## Extreme Male Brain

- Sexual Dimorphism
  - Differences in the male (XY) and female (XX) brains



male

female

androgenized  
female





# Extreme Male Brain

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Coined by  
Simon Baron-  
Cohen

Result of  
exposure to high  
levels of fetal  
testosterone



## Summary

Because certain hereditary diseases show autistic behavior, and autism often runs in families, researchers seek genes underlying the pathophysiology of autism, thus core behaviors. Other researchers argue environmental factors are decisive, citing compelling evidence of an autism epidemic in the United States beginning about 1980. Recognition that environmental factors influence gene expression led to synthesis of these views – an 'epigenetic epidemic' provoked by pervasive environmental agents altering expression of vulnerable genes, inducing characteristic autistic biochemistries in many mothers and infants. Two toxins most implicated in the U.S. autism epidemic are analgesic/antipyretic acetaminophen (Tylenol) and oral antibiotic amoxicillin/clavulanate (Augmentin). Recently herbicide glyphosate (Roundup) was exponentially implicated. What do these toxins have in common? Acetaminophen depletes sulfate and glutathione required to detoxify it. Oral antibiotics kill and glyphosate inhibits intestinal bacteria that synthesize methionine (precursor of sulfate and glutathione, and required to methylate DNA), bacteria that synthesize tryptophan (sole precursor of neuroinhibitor serotonin), and bacteria that restrain ammonia-generating anaerobes. Sulfate plus glutathione normally sulfate fetal adrenal androgen dehydroepiandrosterone to DHEAS – major precursor of placental/postnatal estrogens. Glyphosate (and heavy metals) also inhibit aromatase that turns androgens to estrogens. Placental/postnatal estrogens dehydrate/mature brain myelin sheaths, mature corpus callosum and left hemisphere preferentially, dilate brain blood vessels, and elevate brain serotonin and oxytocin. Stress-induced weak androgens and estrogen depletion coherently explain white matter asymmetry and dysconnection in autism, extreme male brain, low brain blood flow, hyperexcitability, social anxiety, and insufficient maternal oxytocin at birth to limit fetal brain chloride/water and mature GABA.

# Tylenol, Amoxicillin, and Roundup

- Peter Good
  - February 2018
  - Argues that Autism is caused by environmental factors Tylenol, Amoxicillin, and Roundup
  - These impact neurological development and alter gene expression



# Tylenol, Amoxicillin, and Roundup

- 1980-1990s
  - Tylenol used instead of aspirin
    - Given after MMR vaccine and circumcision
  - Amoxicillin given for ear infections
  - Roundup usage increased substantially
- Responsible for epigenetic epidemic



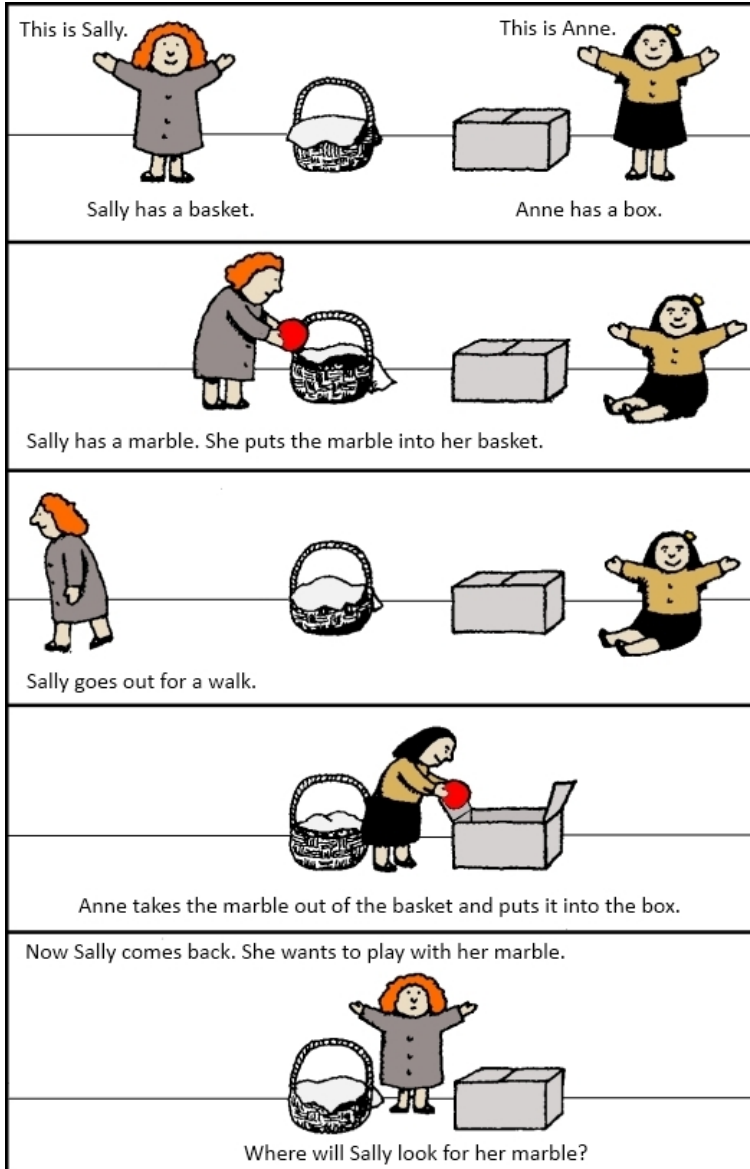


# **Theory of Mind**

**The metacognitive understandings of our own minds as well as the minds of others**





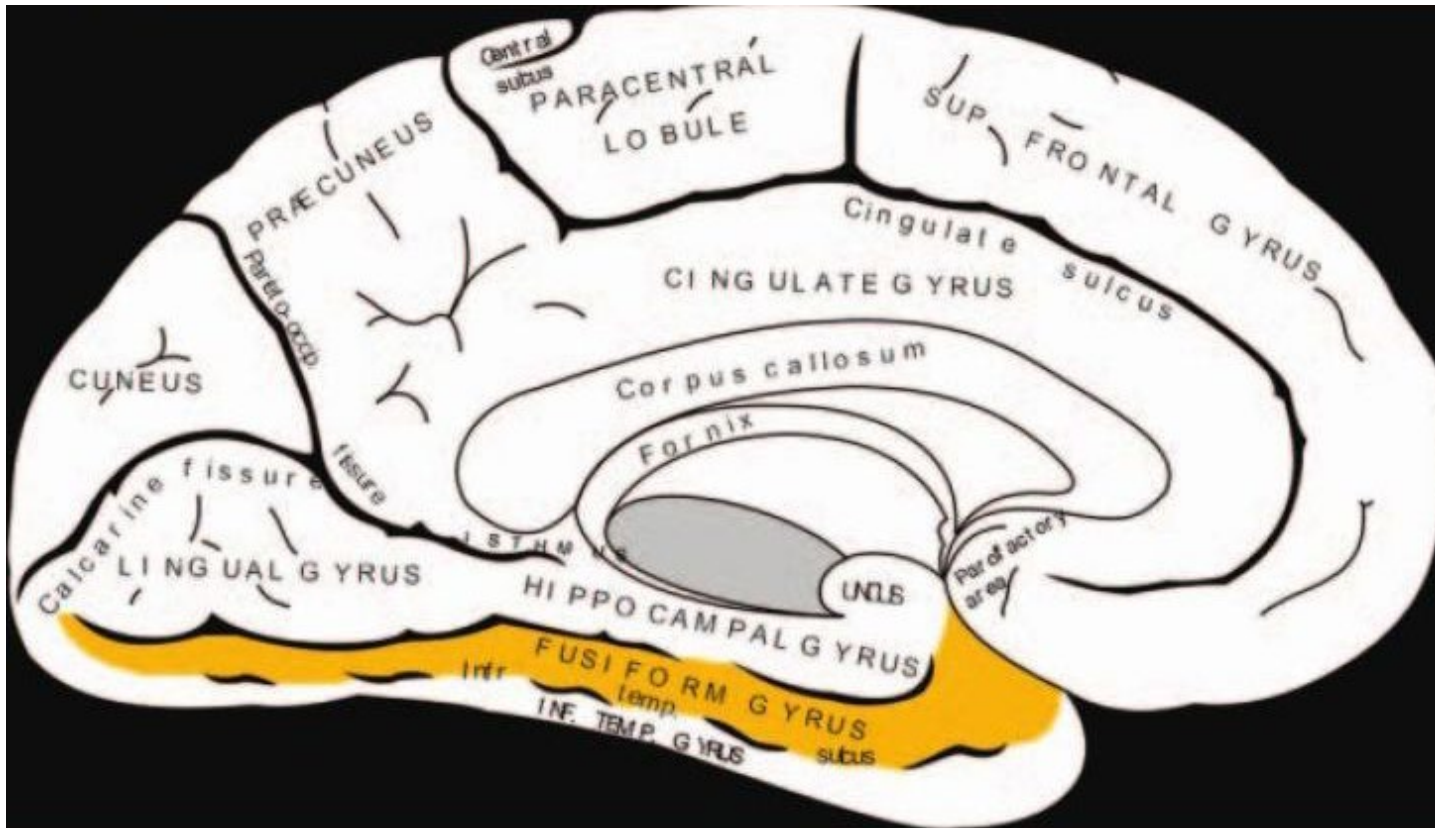


# Sally-Anne

- 85% of typically developing children age 5 answered correctly by pointing to the basket
- 80% of children age 5 with Autism answered incorrectly by pointing to the box



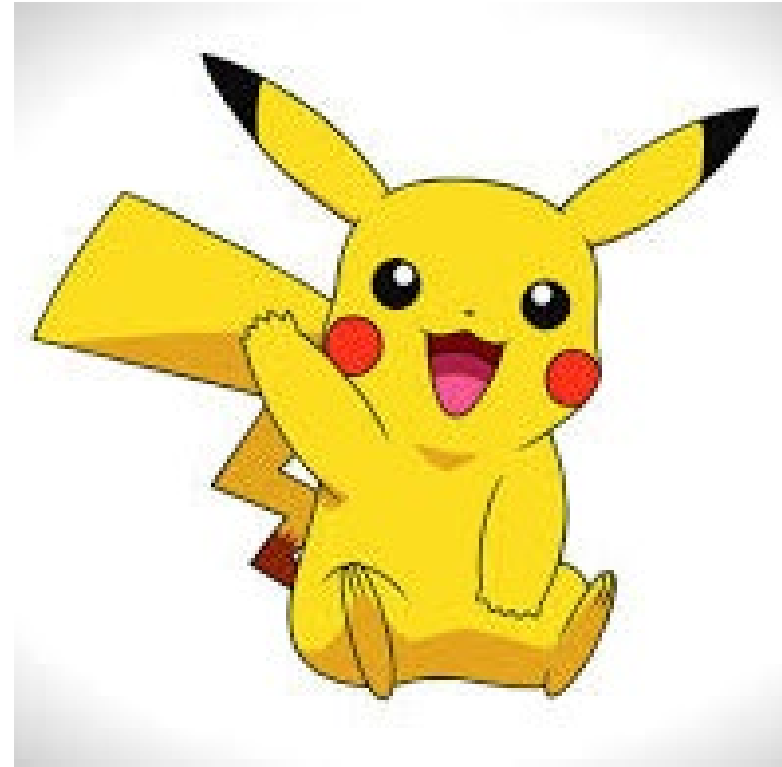
# Fusiform Face Area



- Located within the Fusiform gyrus
- Facial recognition – typical

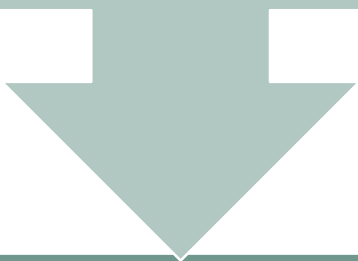


# Fusiform Face Area - Autism





Produced in the  
Paraventricular Nucleus  
of the Hypothalamus



Role:

Social  
bonding

Sexual  
reproduction

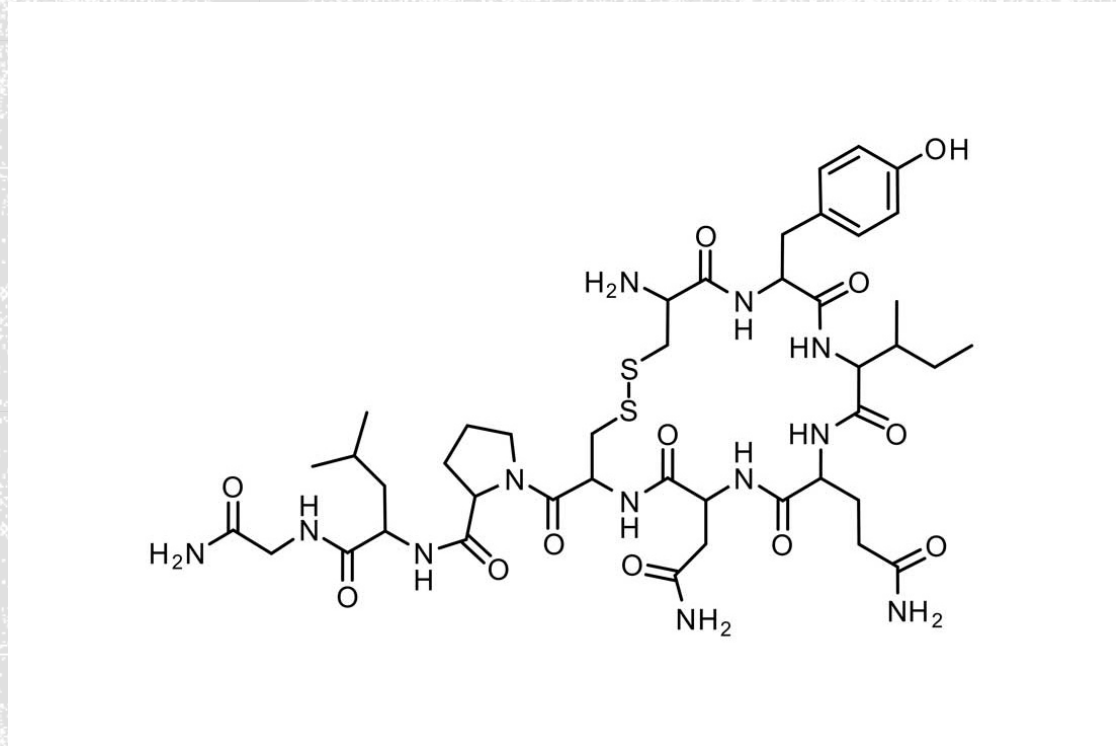
Childbirth

“The Love  
Hormone”

**Oxytocin**







## Oxytocin for Autism?

Scientists find that the hormone improves sociability in a mouse model of autism.

Jan 21, 2015

RUTH WILLIAMS



V. ALTOUNIAN/SCIENCE TRANSLATIONAL MEDICINE

Mutant mice that exhibit many of the characteristics of human autism spectrum disorders, including social deficiency, have more interactions with fellow mice when given a dose of oxytocin, according to a report published today (January 21) in *Science Translational Medicine*. The beneficial effect was also apparent when the mice's own oxytocin production was increased—which may be important for translating such a treatment to humans.

“It’s very exciting. They created a mouse model of autism . . . that had social deficits, and they found that if they gave oxytocin, it would rescue those social deficits,” said [Larry Young](#) who studies social neuroscience at Emory University and was not involved in the work.

## Oxytocin

- Increase in Oxytocin levels increases social interactions

