Neuro-Biology of Autism

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Neurological Complication

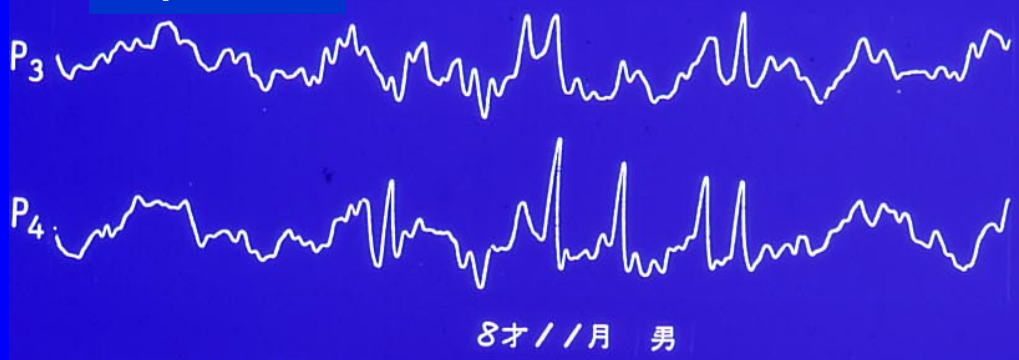
- Tuberous sclerosis
- Neurofiblomatosis
- Fragile X syndrome
- Down syndrome
- etc

Psychiatric Treatment

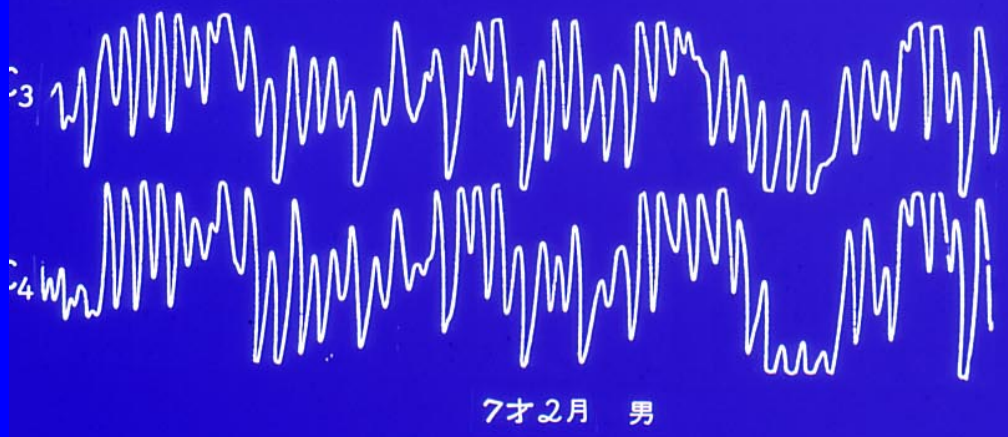
Facilities	Treating	**Non**	**No.**
S for MR	17 (43%)	23 (57%)	40
Keyakinosato	39 (65)	21 (35)	60
		(P<0.05)	

Various Abnormal EEG Patterns

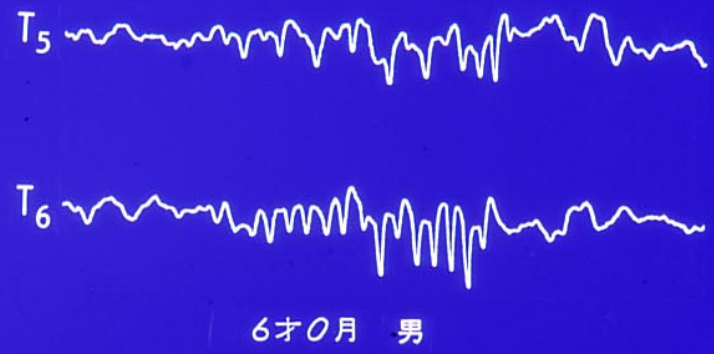
Spike



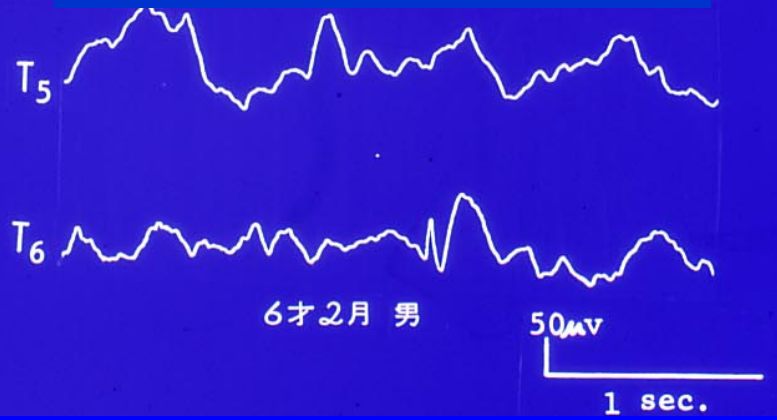
Extreme spindle



6&14HZ PS



Spike & Wave Complex

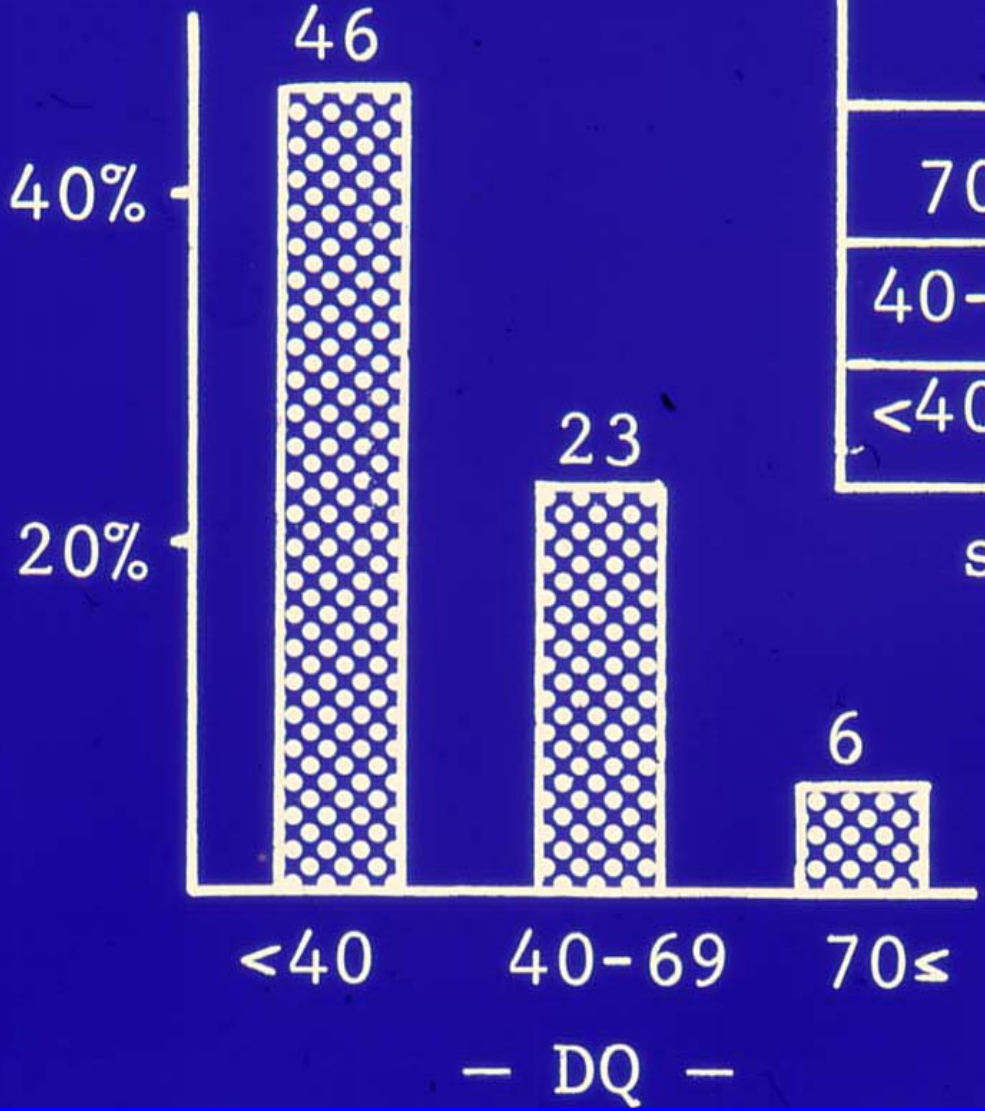


EEG Abnormal Findings in Autism

EEG findings	cases	(%)
Spike or sharp wave	25	(61)
14&6 Hz P.S.	18	(43)
poly-spikes	3	(7)
spike & wave complex	3	(7)
extreme spindle	1	(2)

N=41 (Shimizu et al. 1881)

Abnormal EEG and Developmental Quotient



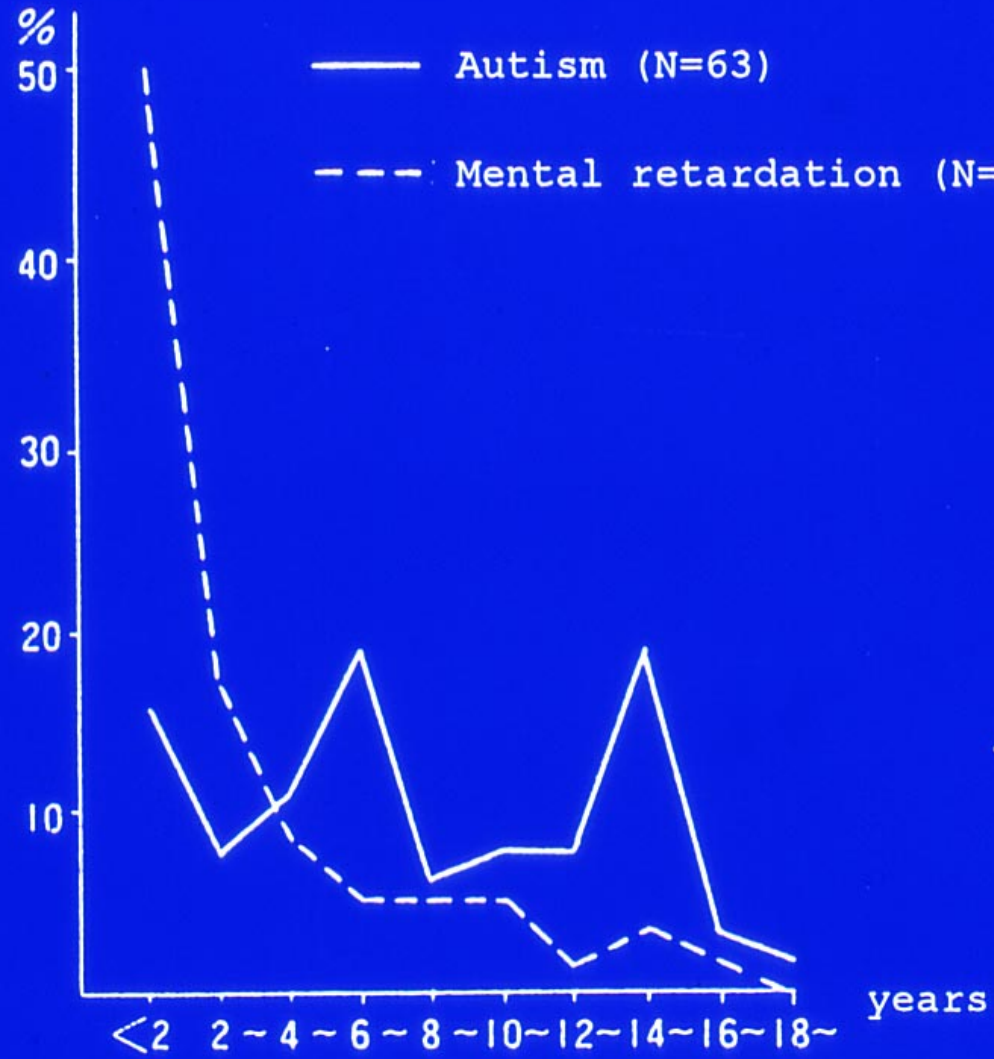
DQ	EEG	
	−	+
70≤	15	1
40-69	63	19
<40	7	6

significant
$p<.05$

Cumulative Ratio of Epilepsy in Course of Autism

	Year	Ratio(%)	Number of subjects	Number of subjects with epilepsy	Mean age of subjects (Range)
Keyakinosato	1993	33.3	60	20	25yr (18° 38yr)
Kawasaki et al.	1988	30.1	209	63	14 (10-22)
Shimizu et al.	1987	25.0	100	25	14 (5-27)
Gillberg et al.	1987	26.1	23	6	- (16-23)
Kobayashi et al.	1985	14.4	90	13	16 (12-27)
Matsumoto et al.	1982	12.1	91	11	14 (9-22)
Lotter et al.	1974	20.0	30	6	- (16-18)
Rutter et al.	1974	28.1	64	18	22
Kanner	1971	18.2	11	2	- (29-39)

Dstribution of Onset Ages of Epilepsy in Autism

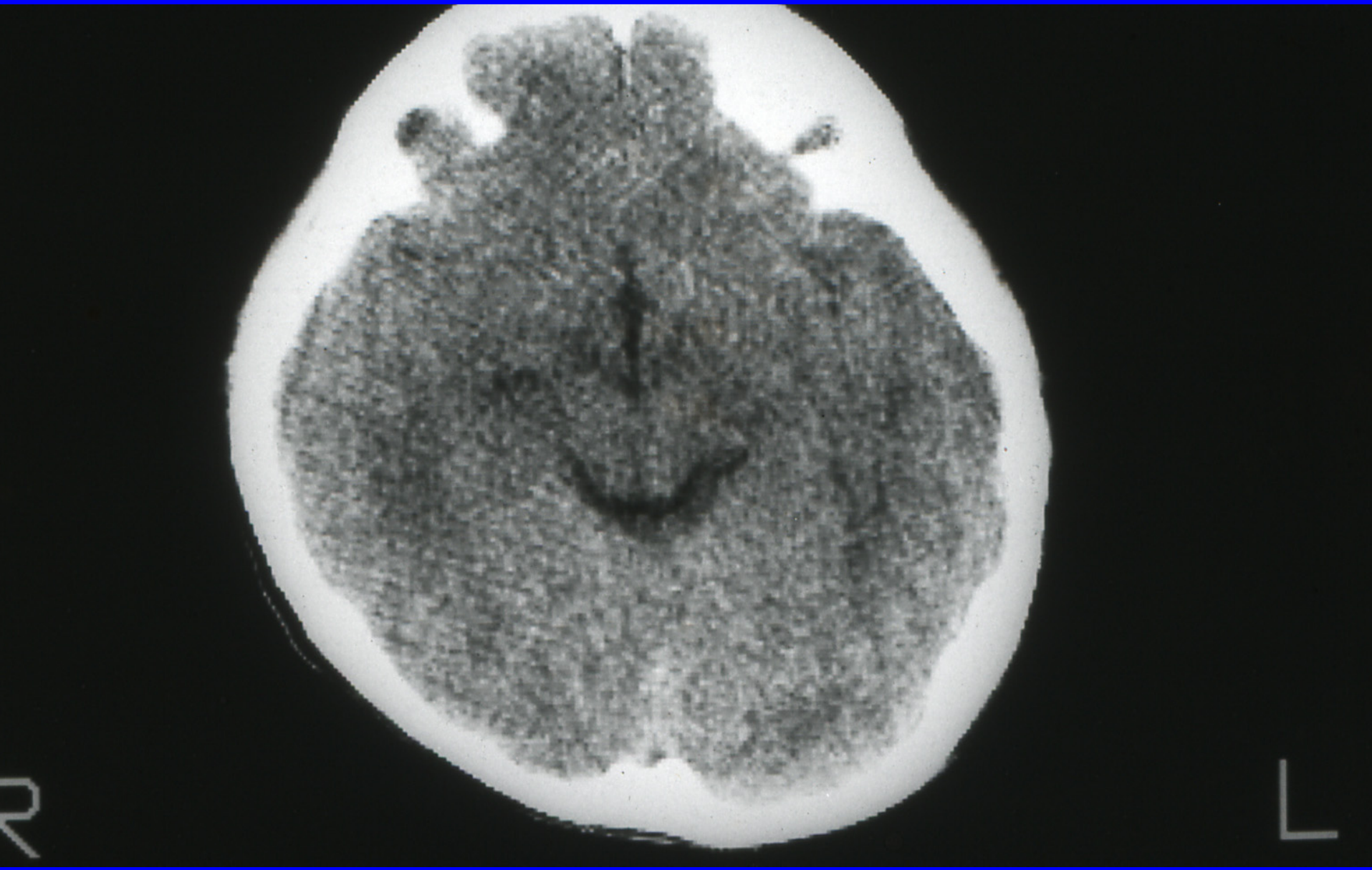


(Kawasaki et al. 1988)

Neuro-imaging

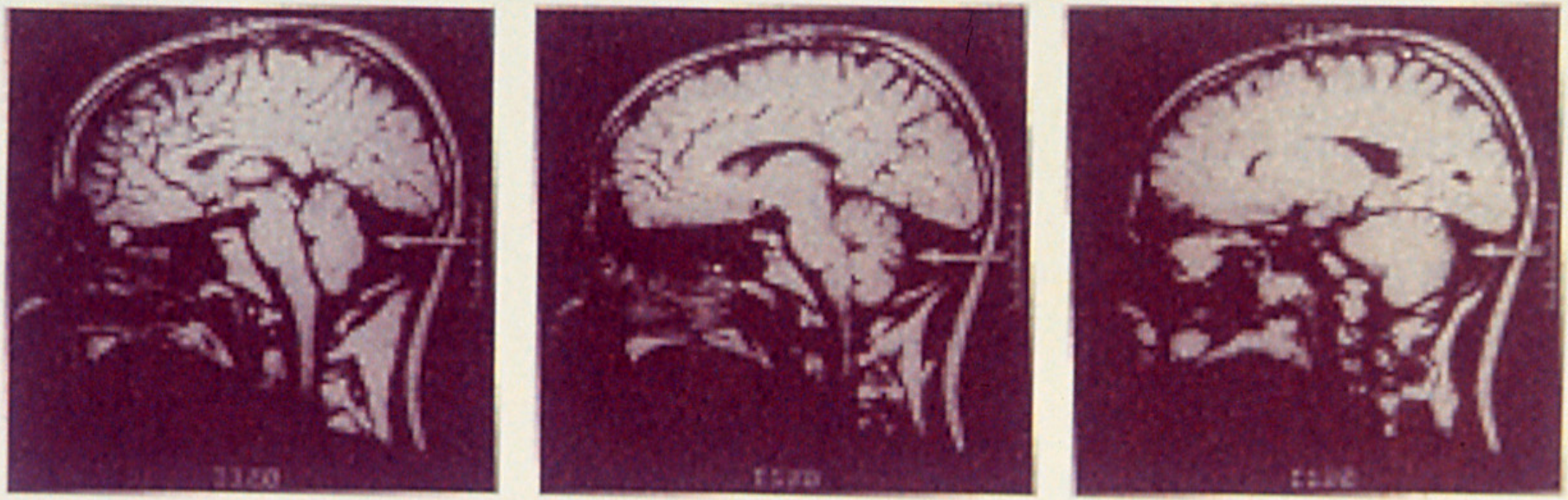
- Brain CT
- MRI

- fMRI
- Near-infrared Spectrography
- SPECT
- PET

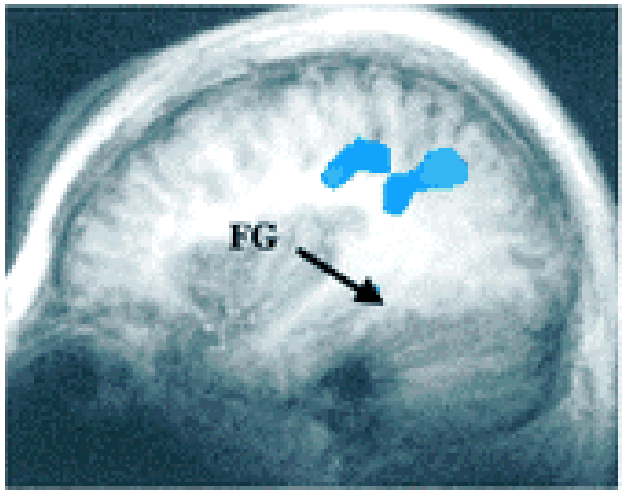

R
L

NORMAL

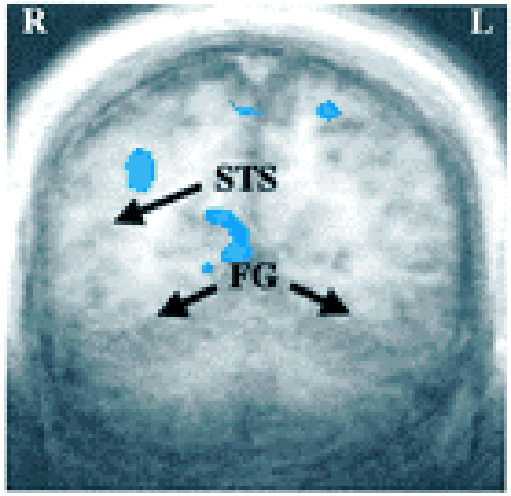
AUTISTIC



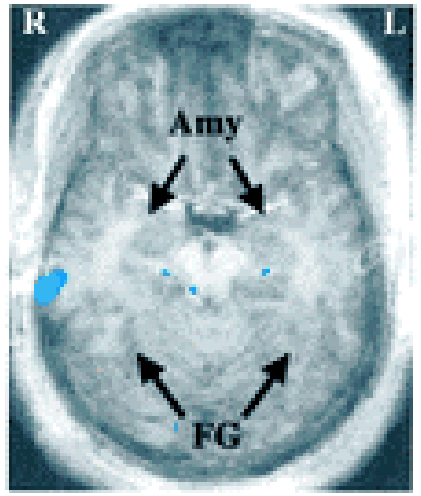
Autism



$x = 34$

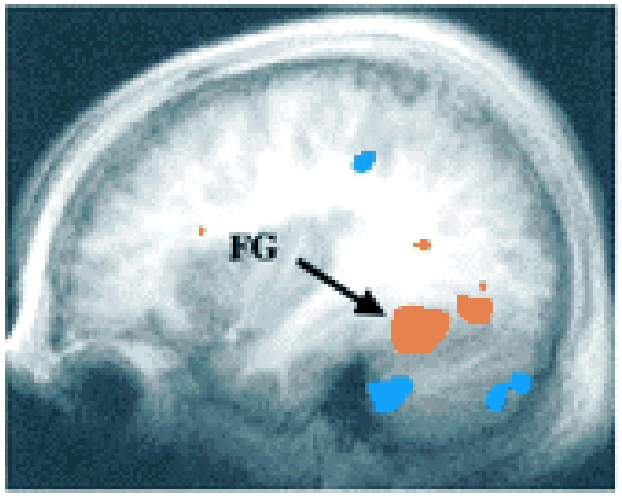


$y = -55$

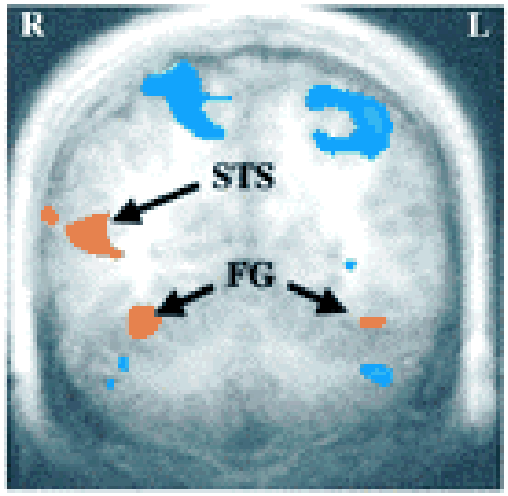


$z = -14$

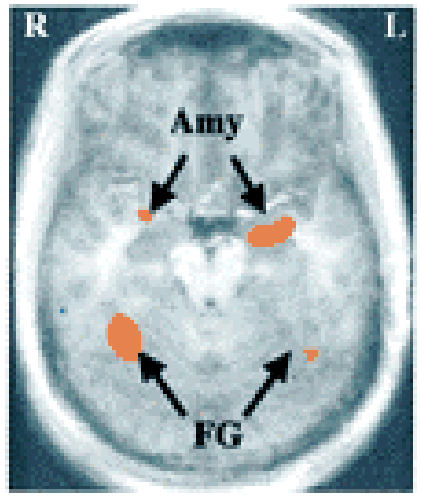
Normal



$x = 34$



$y = -55$



$z = -14$

Dominant Neuropsychological Theories

Theory of Mind

Sally-Anne task

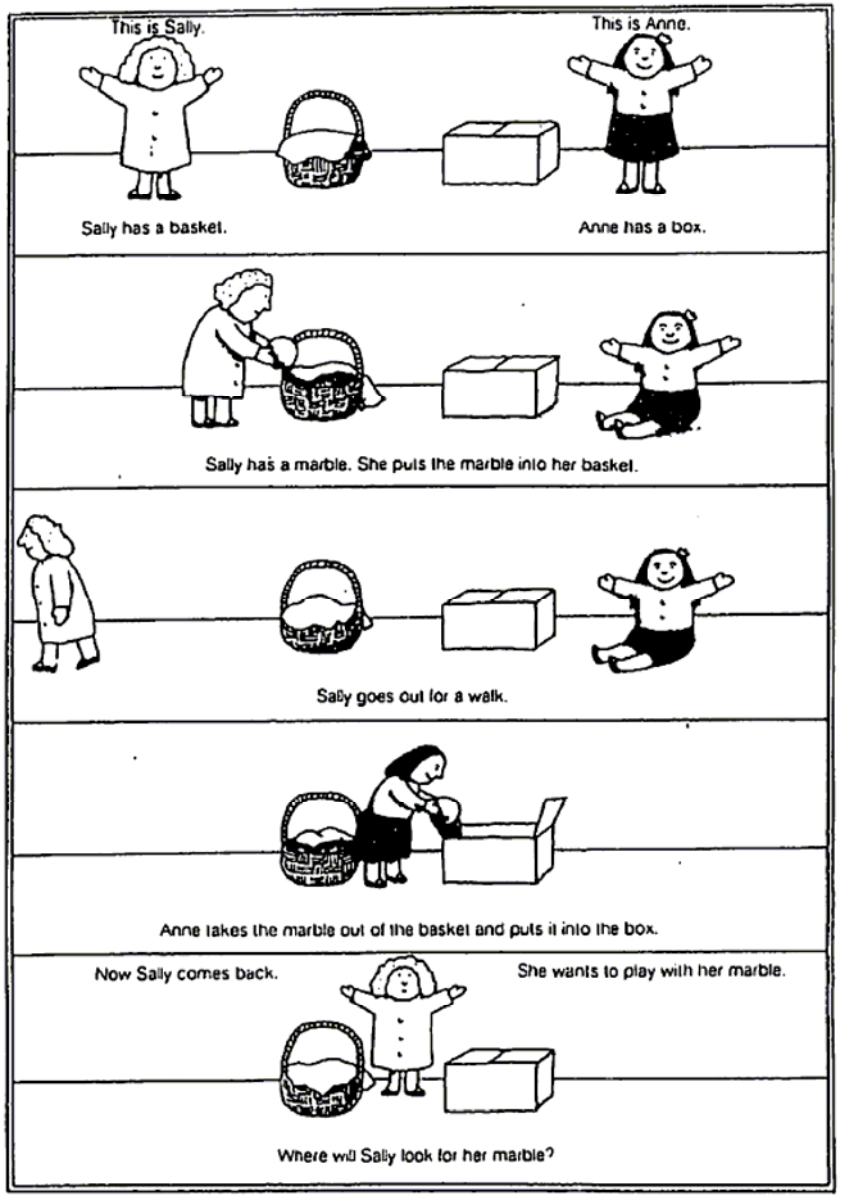


Fig. 10-1. The Sally-Ann task, a test of "mind-reading." (Reproduced from U. Frith, 1989, *Autism: Explaining the Enigma*, Oxford: Blackwell. With kind permission of the artist, Axel Scheffler.)

A result on Sally Anne task for Japanese typically developed children

Age (Year)	fail	passed	%passed
Less than 4	3	0	0.0
4 ~ less than 5	26	9	25.7
5 ~ less than 6	18	23	56.1
6 ~ less than 7	6	48	88.9
7 ~ less than 8	3	39	92.9
8 or more	1	12	92.3
N	57	131	(N=188)

(Mutoh et al 1997)

Sally Ann task and Ohta Staging in ASD, DS and TDC

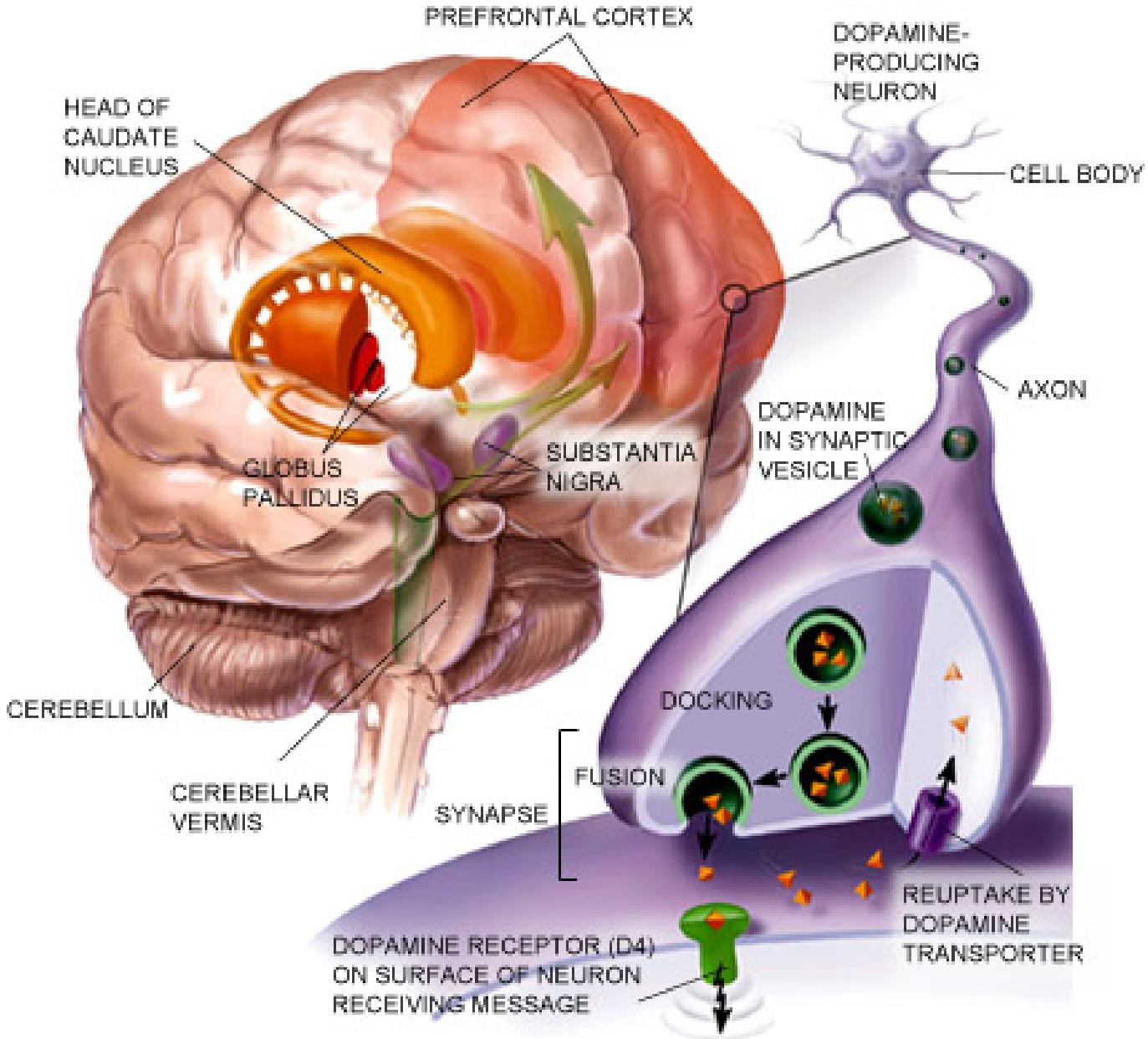
	ASD		Down syndrome		typically developed children	
N	47		42		188	
	F*	P**	F	P	F	P
Stage II			5	0	3	0
Stage III-1	3	0	6	0	20	4
Stage III-2	16	5	15	6	21	37
Stage IV	12	7	7	3	13	90
Stage V	4					

*F: Fail, **P: Pass

Executive Functions

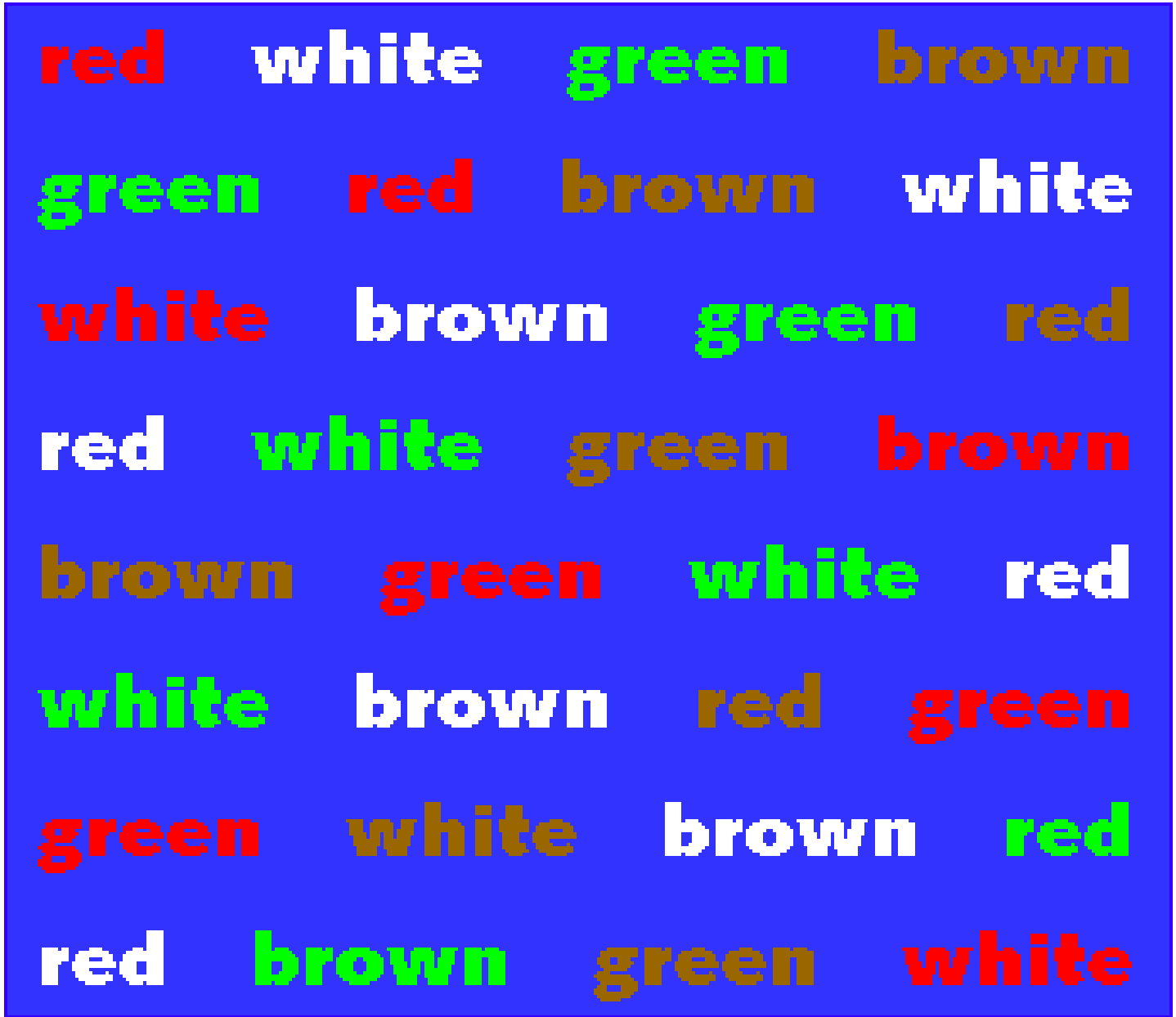
Behaviors mediated by the frontal lobes , such as

planning, impulse control, inhibition of prepotent but incorrect responses, set maintenance, organized search, and flexibility of thought and action


PREFRONTAL CORTEX
DOPAMINE-PRODUCING NEURON
HEAD OF CAUDATE NUCLEUS
CELL BODY
AXON
DOPAMINE IN SYNAPTIC VESICLE
SUBSTANTIA NIGRA
GLOBUS PALLIDUS
CEREBELLUM
DOCKING
FUSION
CEREBELLAR VERMIS
SYNAPSE
REUPTAKE BY DOPAMINE TRANSPORTER
DOPAMINE RECEPTOR (D4) ON SURFACE OF NEURON RECEIVING MESSAGE

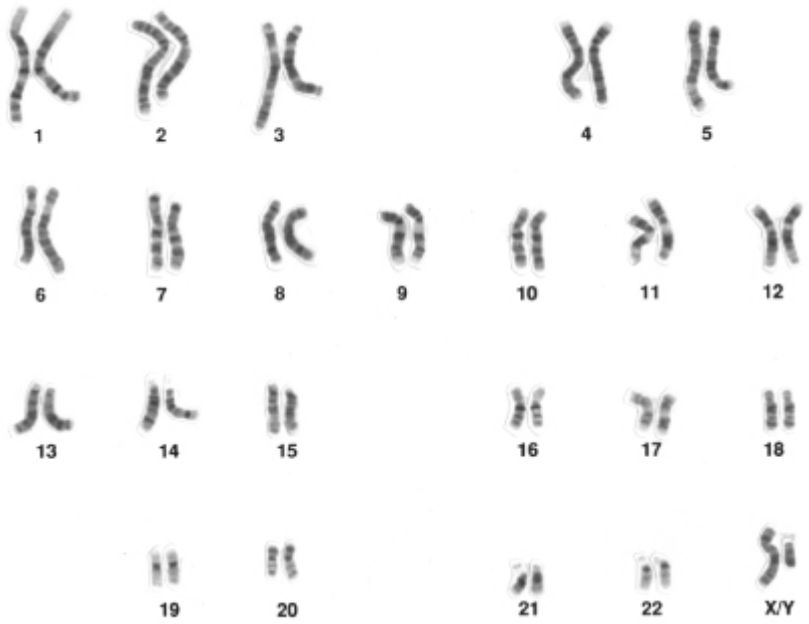
Wisconsin Card Sorting Test

Stroop Test (Inhibition)



Weak Central Coherence

Chromosomes



Ratio of Concordance in Autism

Reporters	Year	MZ		DZ	
Folstein & Rutter	1977	4/11	(0.36)	0/10	(0)
Steffenburg et al	1989	10/11	(0.91)	0/10	(0)
Ritvo et al	1985	22/23	(0.96)	4/17	(0.24)
Smalley et al	1988	9/11	(0.82)	2/9	(0.22)
Wakabayashi et al	1981	3/8	(0.39)	0/2	(0)
Total		48/64	(0.75)	6/48	(0.13)
			(Nakane 1998)		

- Researchers are looking for (a) genetic risk factor(s), but they never have proved it (them) conclusively.
- Several candidate genes are identified.

  ex. Chromosome 7, 17 etc.

Conclusion

Autism is a complex disease caused by the interaction of multiple genes and environmental influences.