In collaborazione

PRESIDENZA DEL CONSIGLIO DEI MINISTRI
Dipartimento Politiche Antidroga

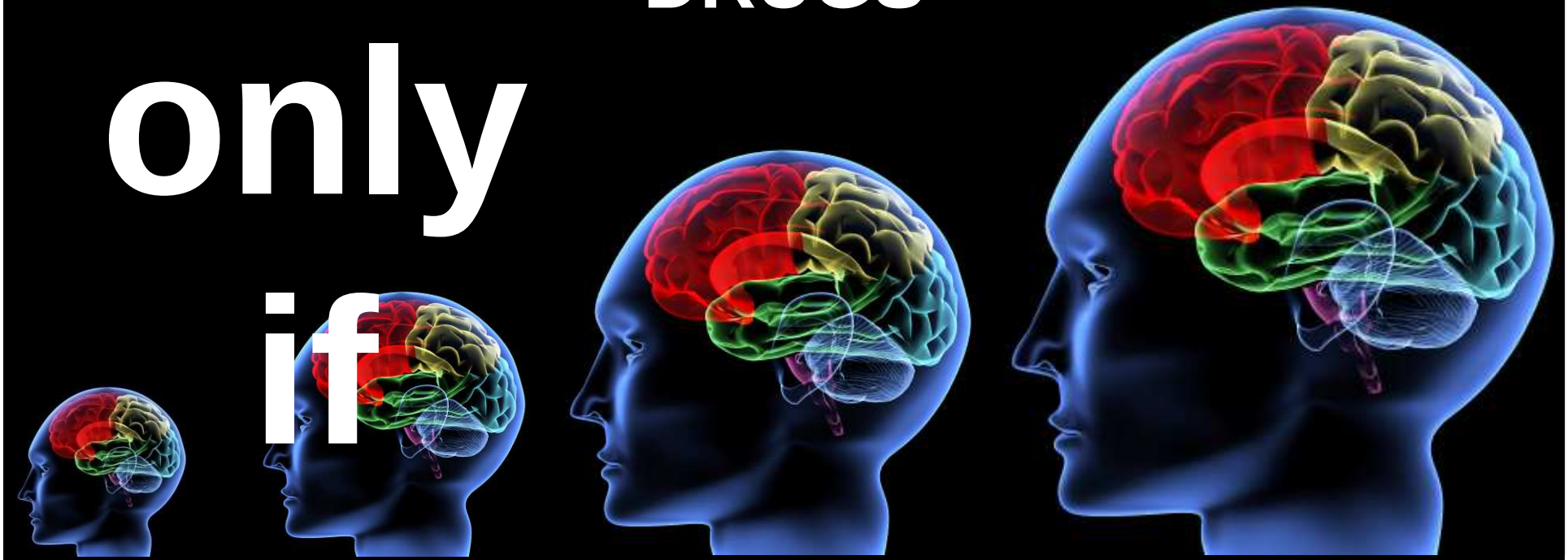
NEUROSCIENZE e DIPENDENZE

REGIONE DEL VENETO
Programma Regionale sulle Dipendenze

Verona, 9 June 2010

BRAIN MATURATION
BEHAVIORAL PROBLEM
DRUGS

only if



Francesco A. Bricolo M.D.

Martirio di san Matteo

WHAT WE KNOW

EXAMPLE

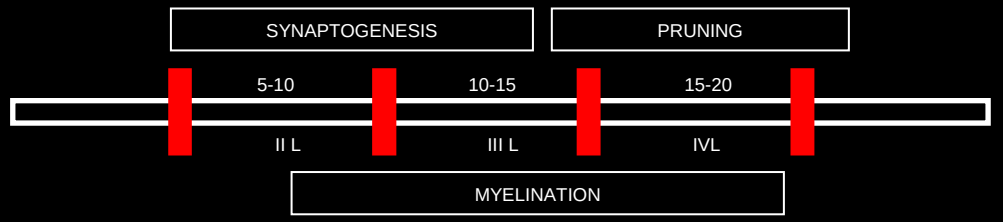
WHAT WE DO

WHAT WE KNOW

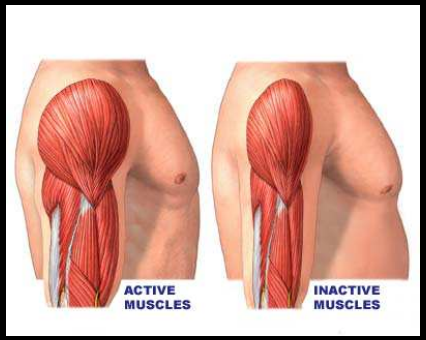
1. TIME

2. DIRECTION

3. EVENTS

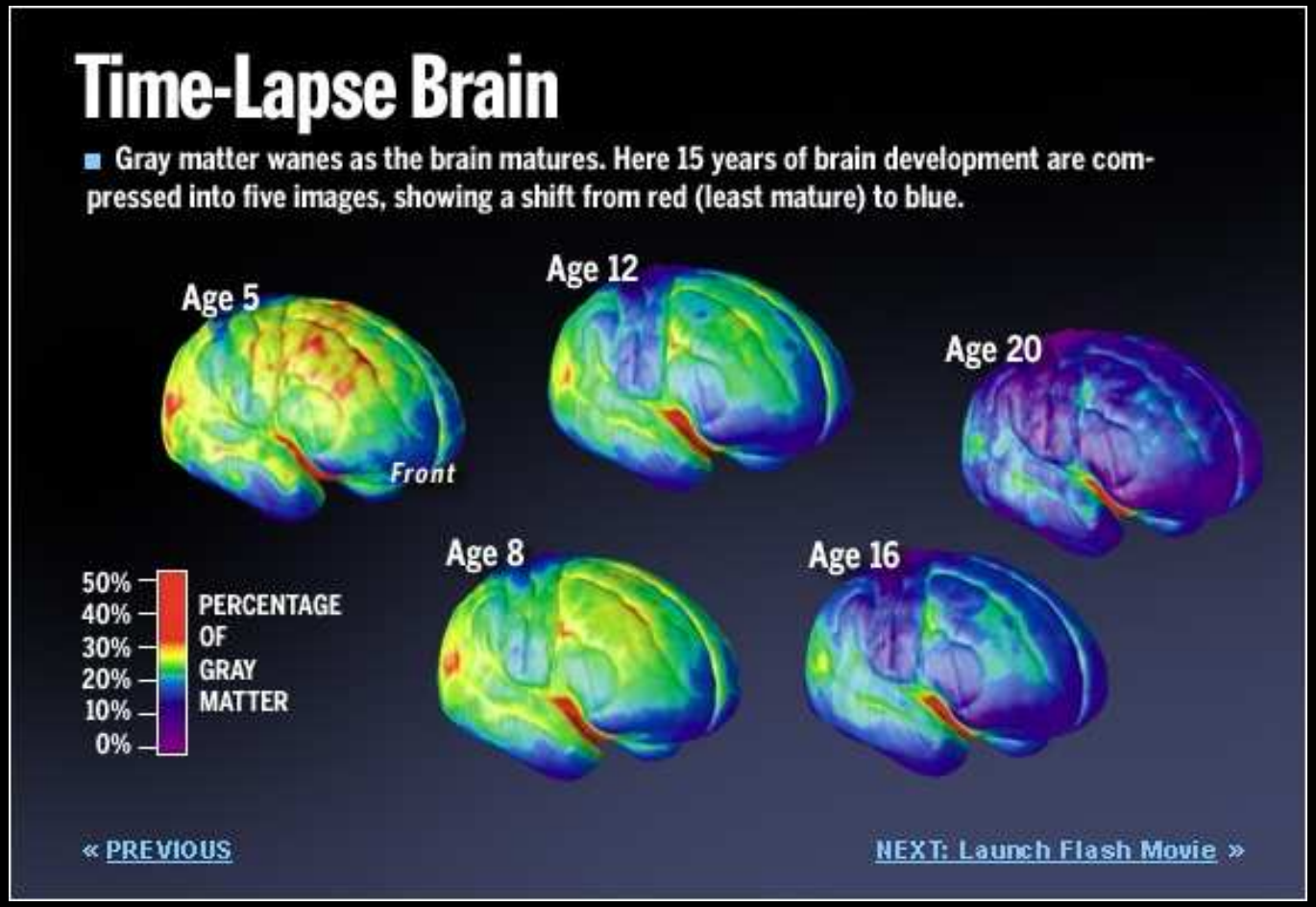


4. RULES



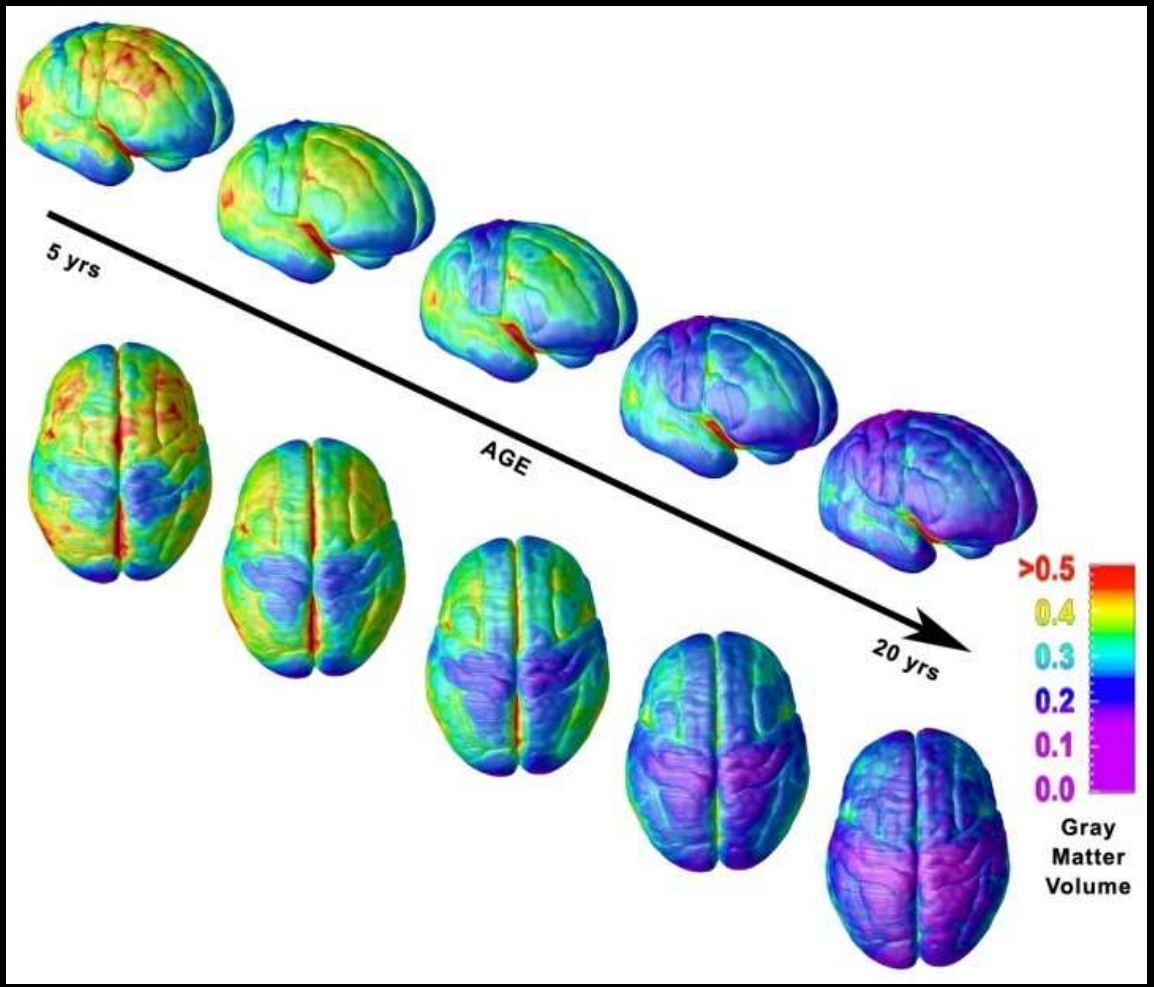
WHAT WE KNOW

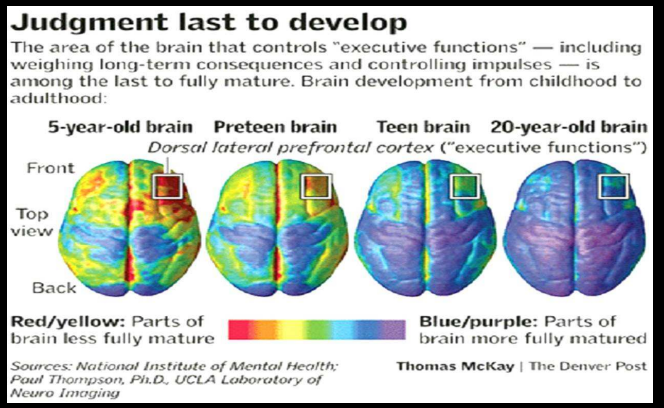
1. TIME

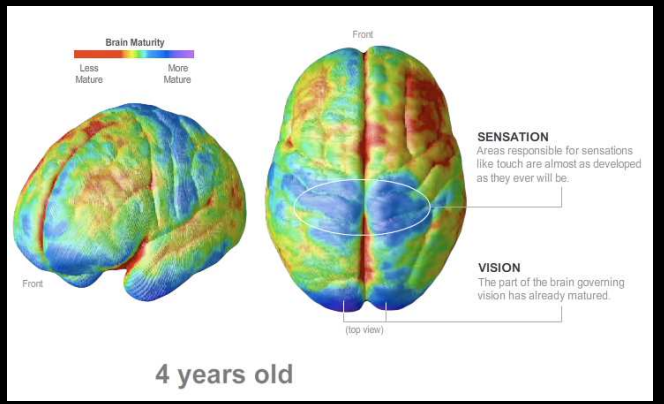


WHAT WE KNOW

1. TIME







WHAT WE KNOW

1. TIME

Judgment last to develop

The area of the brain that controls "executive functions" — including weighing long-term consequences and controlling impulses — is among the last to fully mature. Brain development from childhood to adulthood:

5-year-old brain **Preteen brain** **Teen brain** **20-year-old brain**

Dorsal lateral prefrontal cortex ("executive functions")

Front

Top view

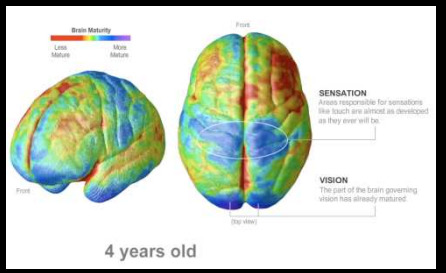
Back

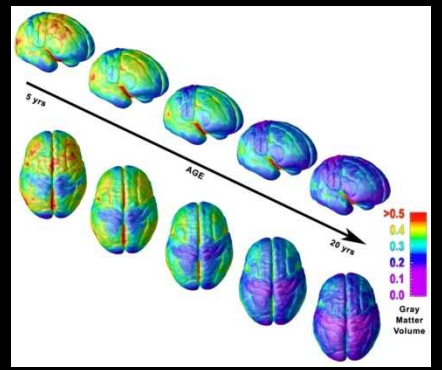
Red/yellow: Parts of brain less fully mature

Blue/purple: Parts of brain more fully matured

Sources: National Institute of Mental Health; Paul Thompson, Ph.D., UCLA Laboratory of Neuro Imaging

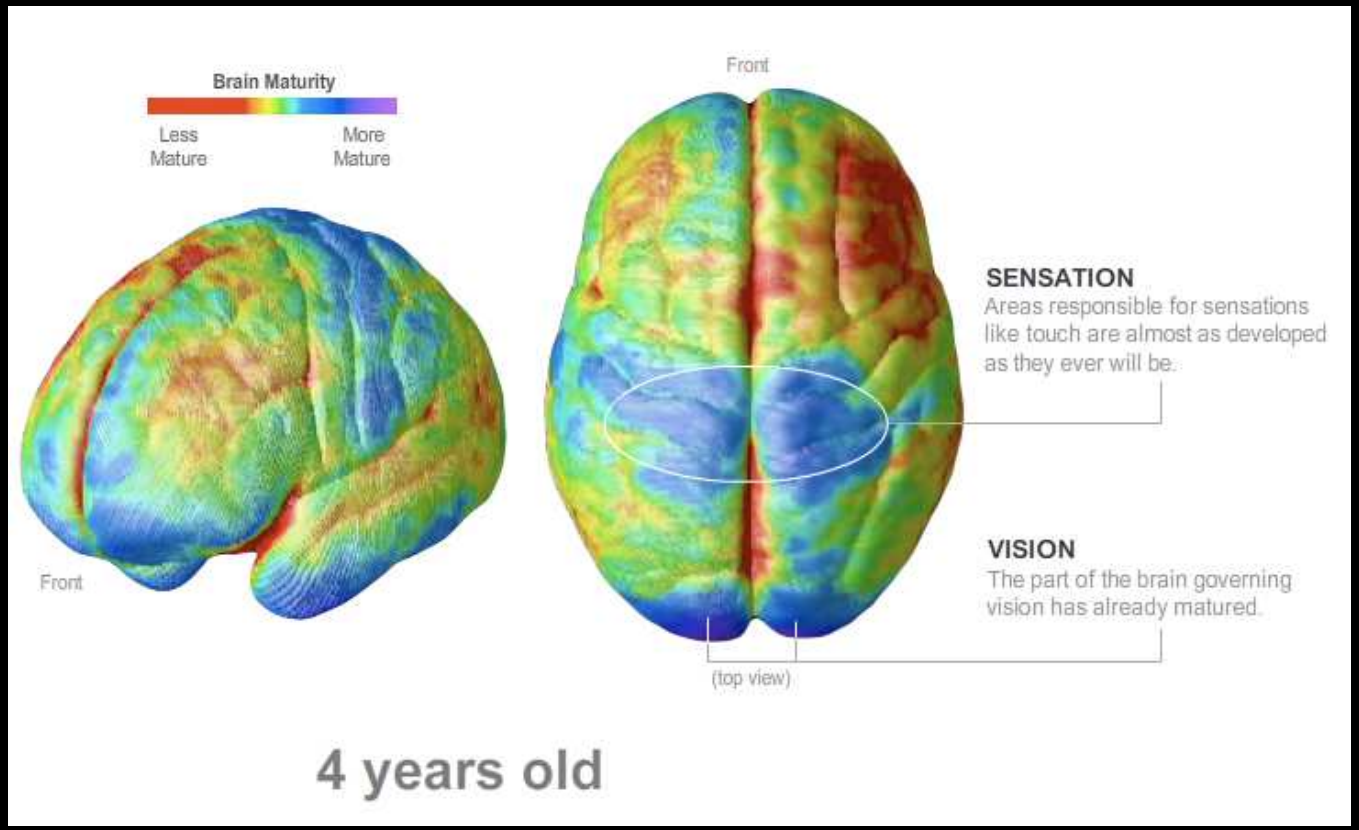
Thomas McKay | The Denver Post

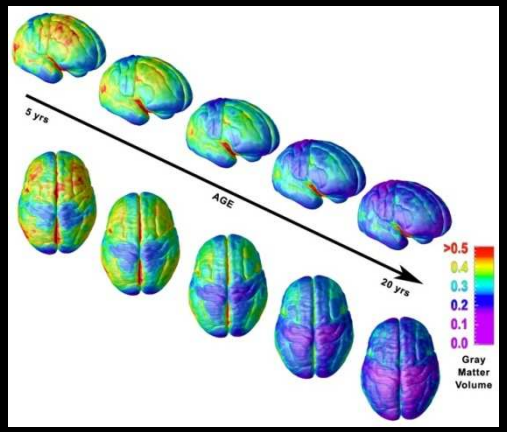


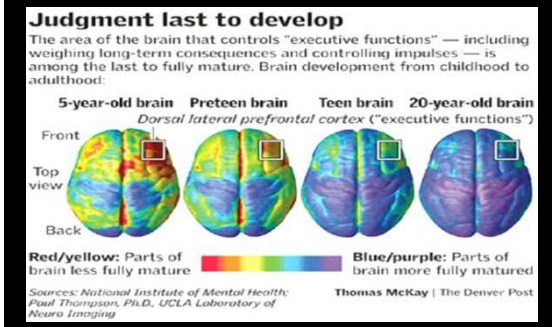


WHAT WE KNOW

1. TIME

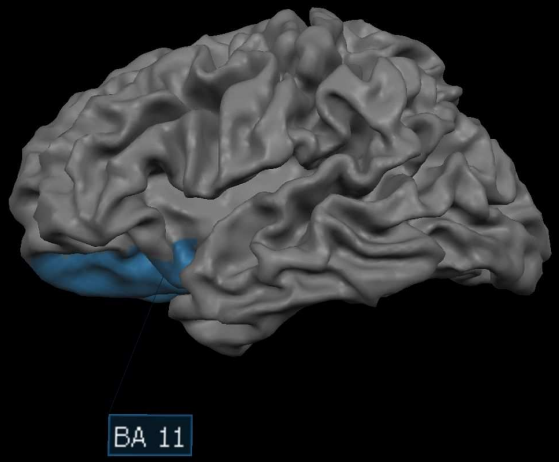




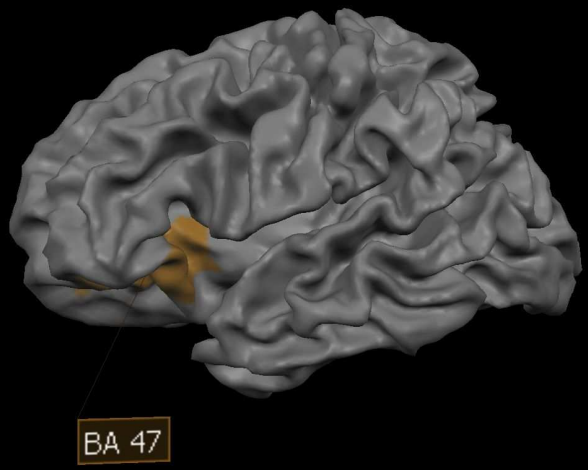


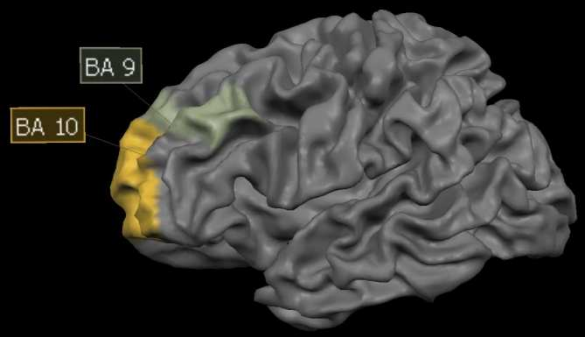
WHAT WE KNOW

OFC
Orbito Frontal Cortex



VLPFC
Ventro Lateral Prefrontal Cortex

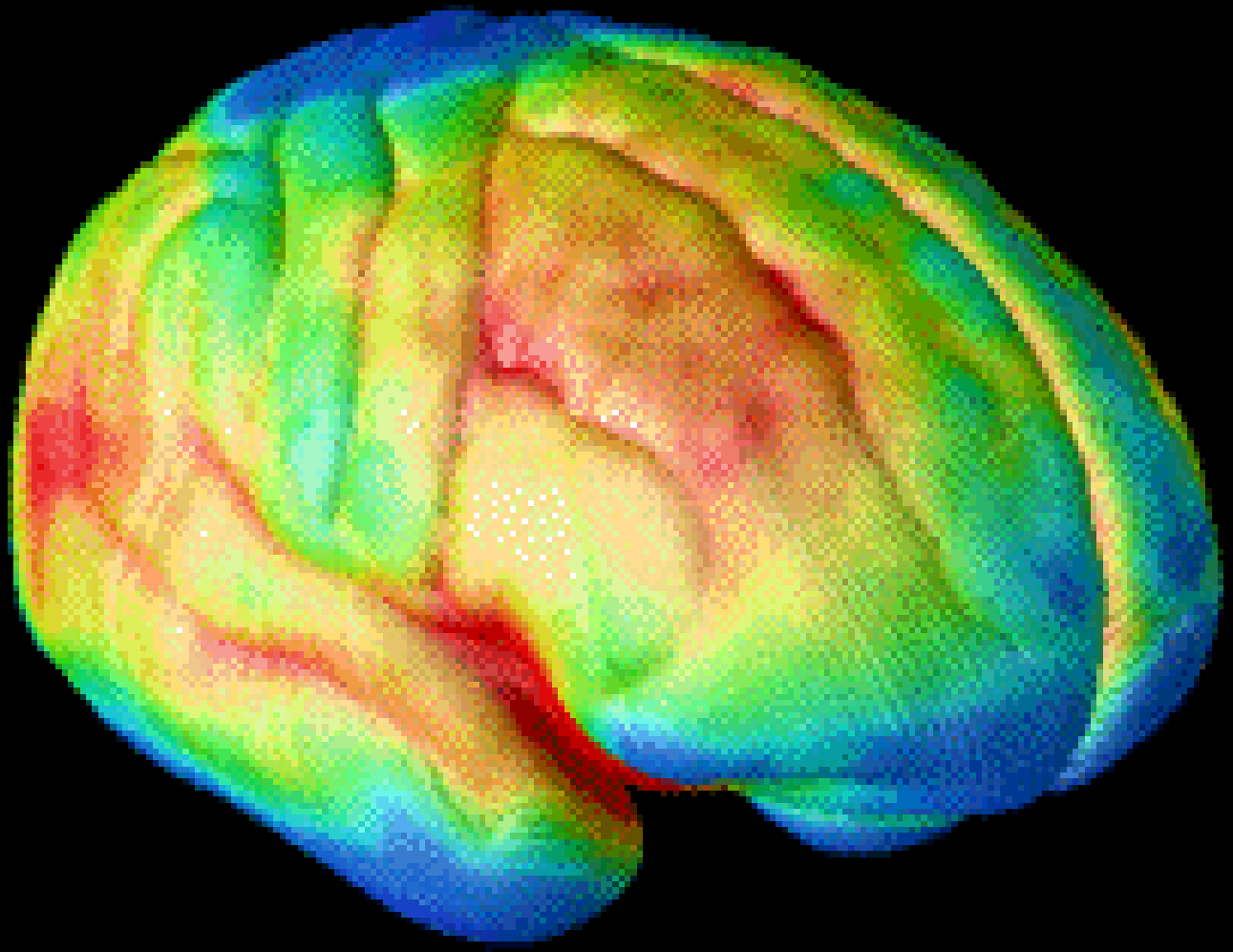




DLPFC
Dorso Lateral Prefrontal Cortex

WHAT WE KNOW

1. TIME



WHAT WE KNOW

DIRECTION

neocortex

old brain

up

down

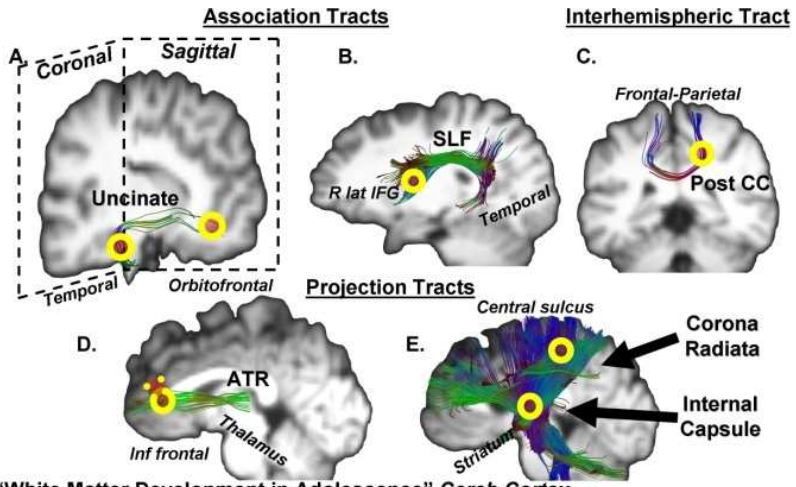
adolescence

L > C

WHAT WE KNOW

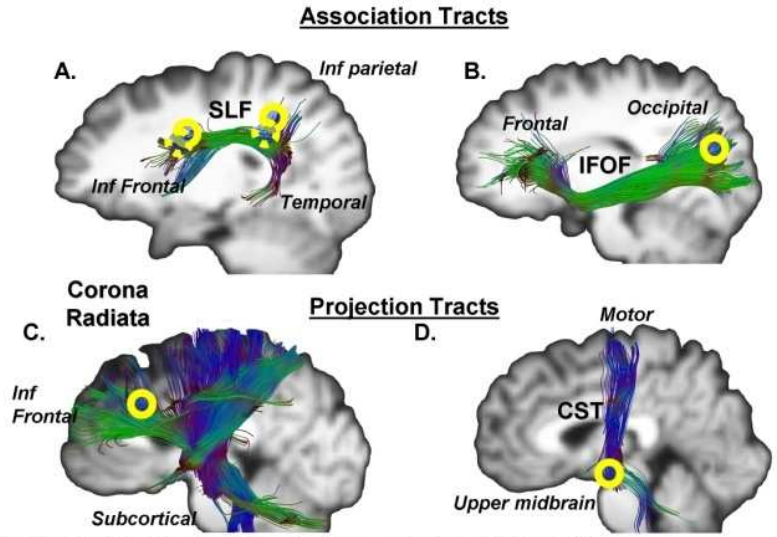
2. DIRECTION

Immature During Adolescence



"White Matter Development in Adolescence" *Cereb Cortex.* 2010 Jan 5." Used with permission, M. Asato MD

Matures by Adolescence



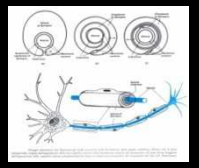
"White Matter Development in Adolescence" *Cereb Cortex.* 2010 Jan 5." Used with permission, M. Asato MD

WHAT WE KNOW

3. EVENTS

+

+



SYNAPTOGENESIS | PRUNING

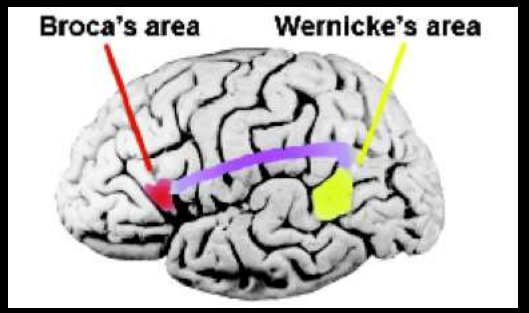
5-10 | 10-15 | 15-20

II L | III L | IVL

MYELINATION

4-12 mesi

Linguaggio



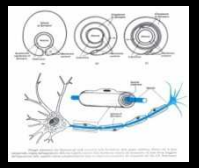
5

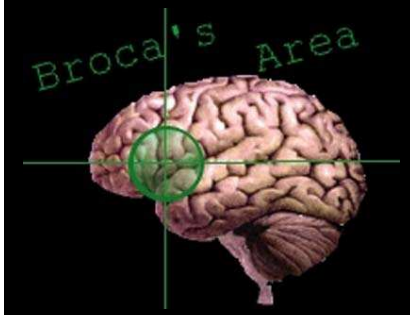
WHAT WE KNOW

3. EVENTS

+

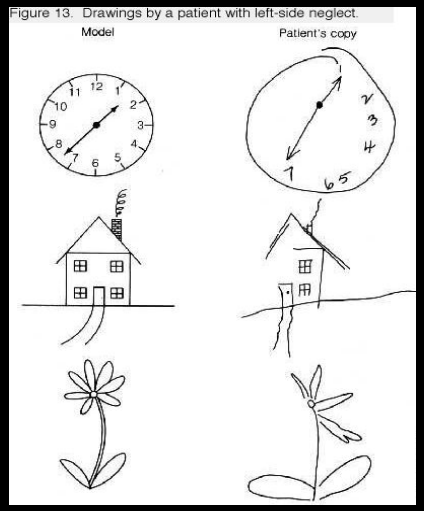
+





5 Linguaggio

I L

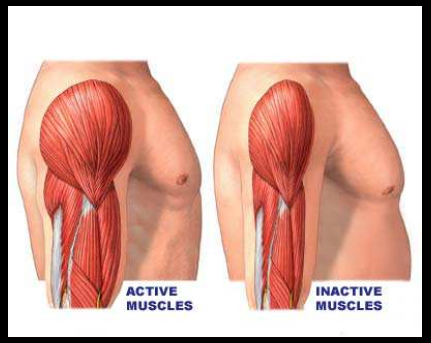


7 Schema corporeo

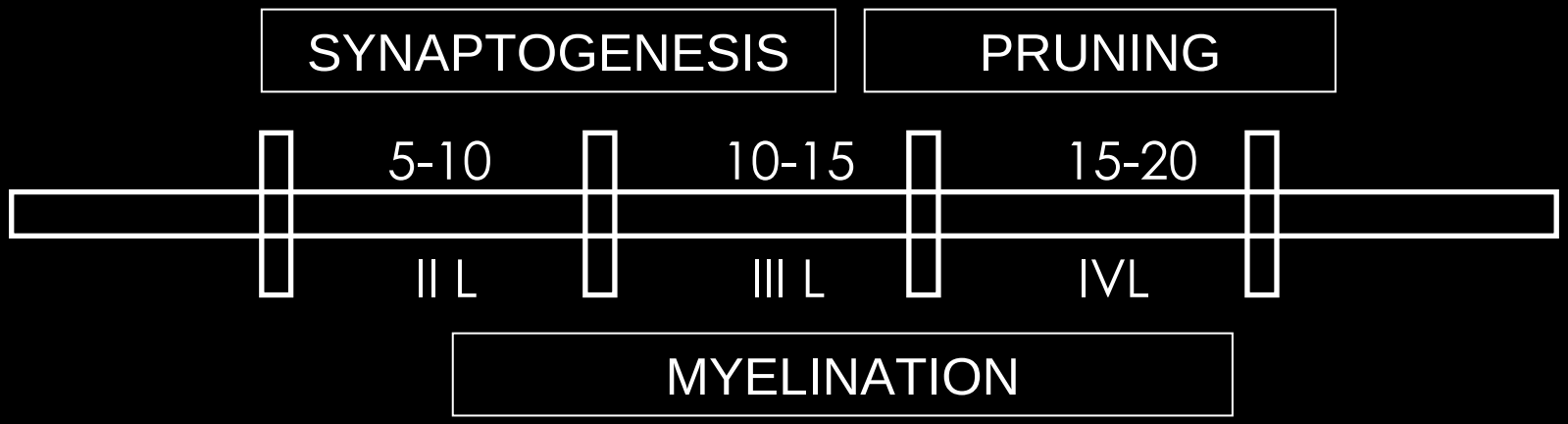
I L

WHAT WE KNOW

4. RULES

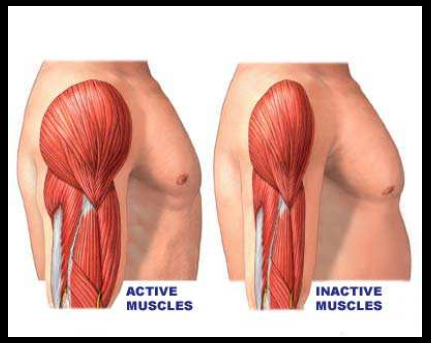


USE-IT-OR-LOSE-IT



WHAT WE KNOW

4. RULES



ES F MR CD

VULNERABILITY

USE-IT-OR-LOSE-IT

SYNAPTOGENESIS

PRUNING

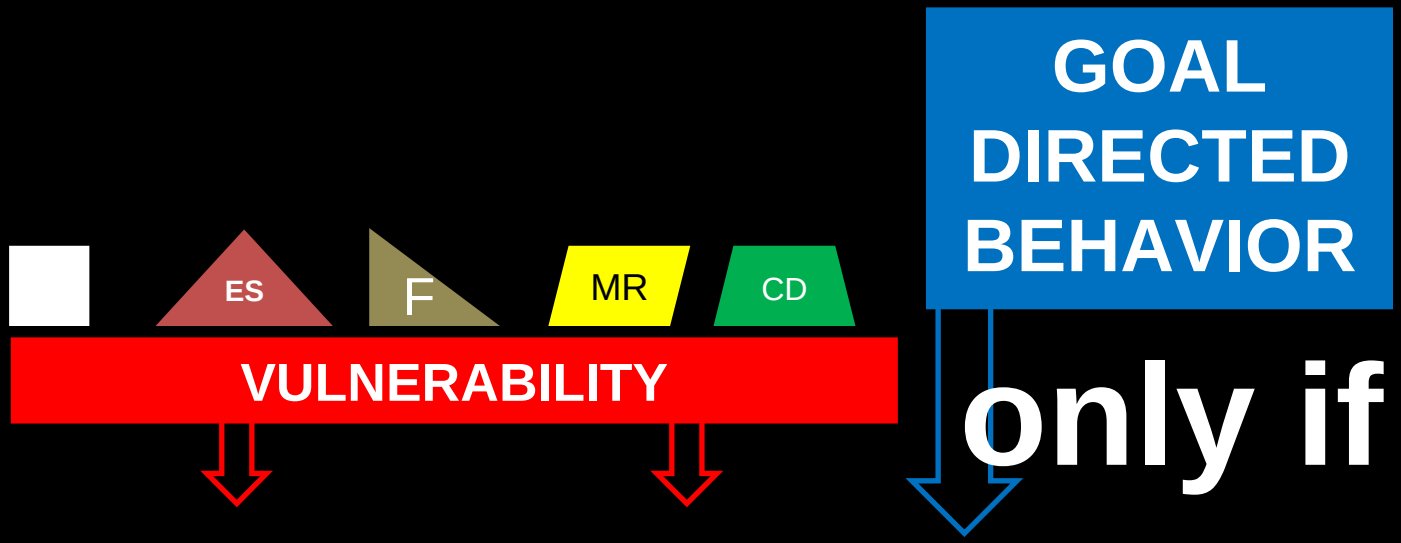
5-10 10-15 15-20

II L III L IVL

MYELINATION

WHAT WE KNOW

SUMMARY?



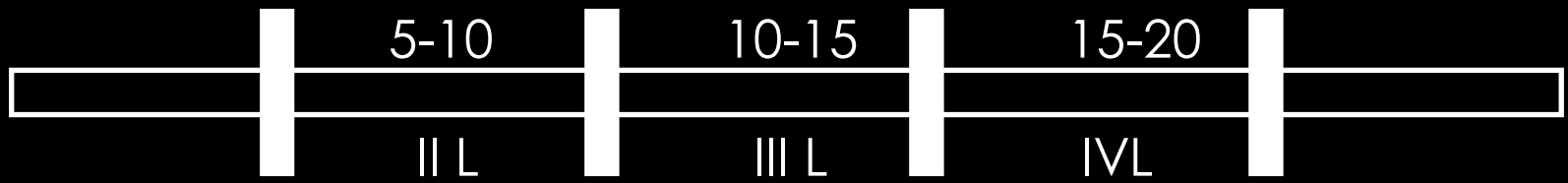
GOAL DIRECTED BEHAVIOR

only if

USE-IT-OR-LOSE-IT

SYNAPTOGENESIS

PRUNING



MYELINATION

RISK TAKING 

 PEER PRESSURE

TEMPERAMENT 

 CANNABIS

EXTERNALIZING 

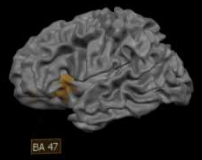
RISK TAKING

RISKY SELECTIONS ADULTS VS ADOLESCENTS

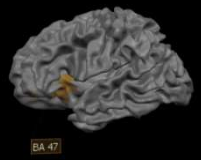
Neir Eshel, 2007

VS

> OFC/VLPFC (BA 47) dACC (BA 32)

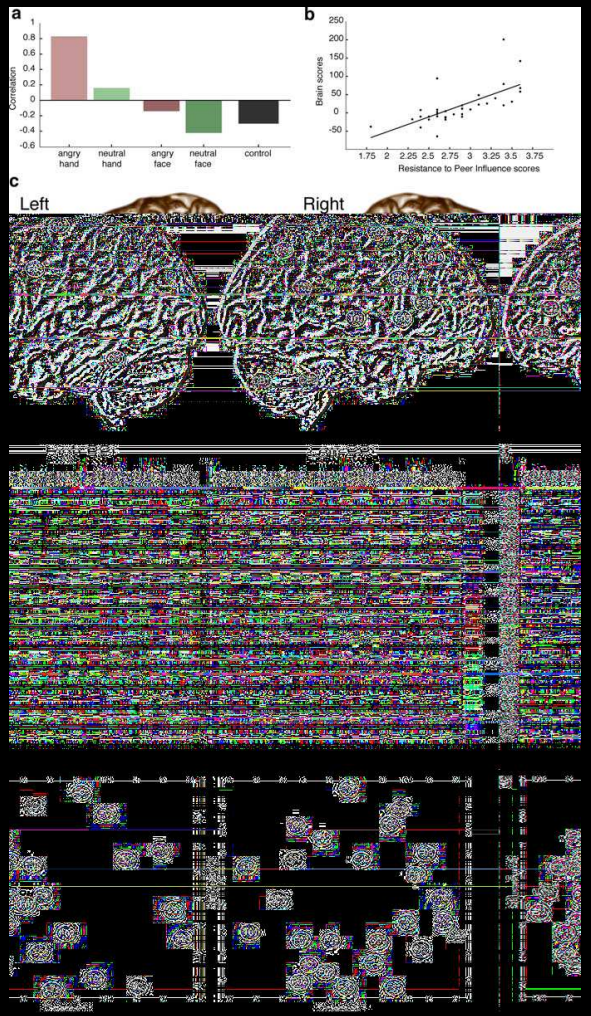


> OFC/VLPFC (BA 47) dACC (BA 32)



“adolescents engage prefrontal regulatory structures to a lesser extent than adults when making risky economic choices”

PEER PRESSURE

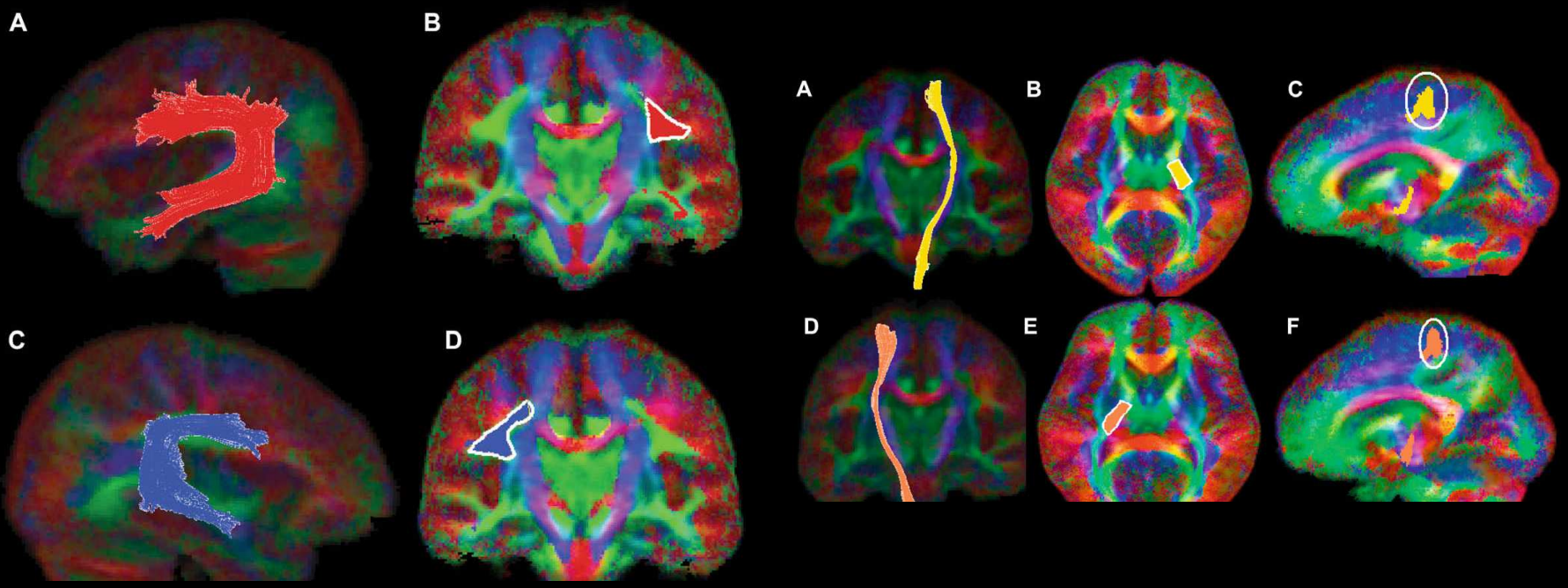


Paus T, 2007; Grosbras 2007

"cortical thickness increased with the resistance to peer influence"

CANNABIS

“MAY AFFECT TRAJECTORY OF NORMAL BRAIN MATURATION”



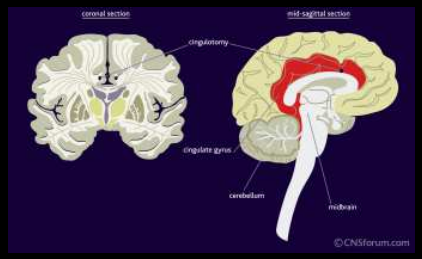
Ashtari M, Cervellione K, Cottone J, Ardekani BA, Sevy S, Kumra S. Diffusion abnormalities in adolescents and young adults with a history of heavy cannabis use. Psychiatr Res. 2009 Jan;43(3):189-204.

TEMPERAMENT

Gardini S, Cloninger CR, Venneri A. Individual differences in personality traits reflect structural variance in specific brain regions. Brain Res Bull. 2009 Jun 30;79(5):265-70. Epub 2009 Mar 28.

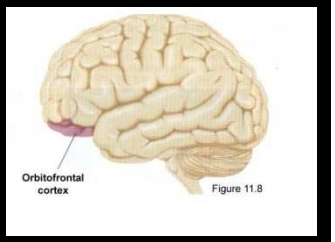
NOVERLTY SEEKING

correlated positively with grey matter volume in frontal and posterior cingulate regions.



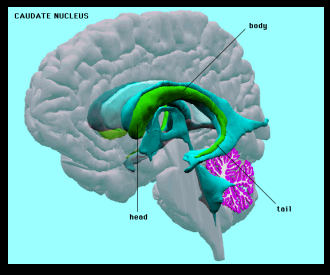
HARM AVOIDANS

negative correlation with grey matter volume in orbito-frontal, occipital and parietal structures.



REWARD DEPENDENCE

negatively correlated with grey matter volume in the caudate nucleus and in the rectal frontal gyrus.

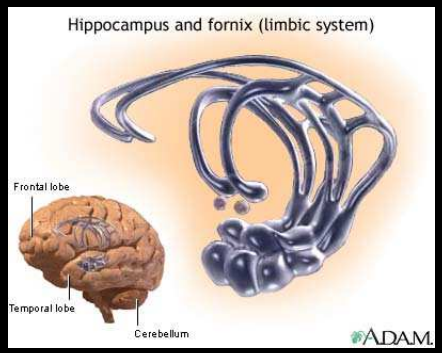


EXTERNALIZING

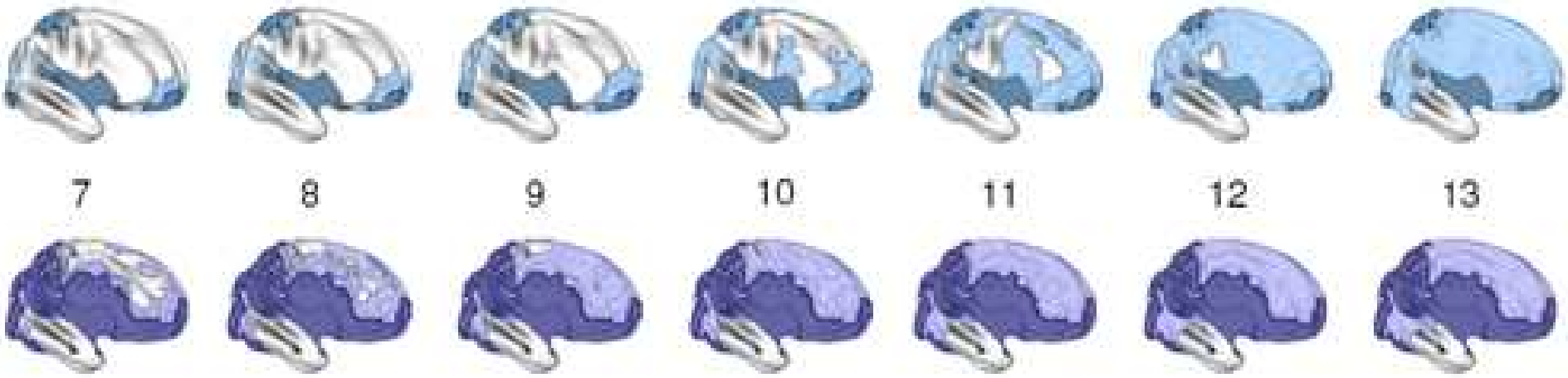
Bjork JM, Chen G, Smith AR, Hommer DW. Incentive-elicited mesolimbic activation and externalizing symptomatology in adolescents. J Child Psychol Psychiatry. 2009 Dec 11

"exaggerated limbic response to outcomes of reward-directed behavior"

NIH



DISTURBI COMPORTAMENTALI



GRUPPO SANO

WHAT WE CAN DO

CLINICAL PRACTICE

http://www.neuroscienzedipendenze.it

NEUROPSYCHOLOGY

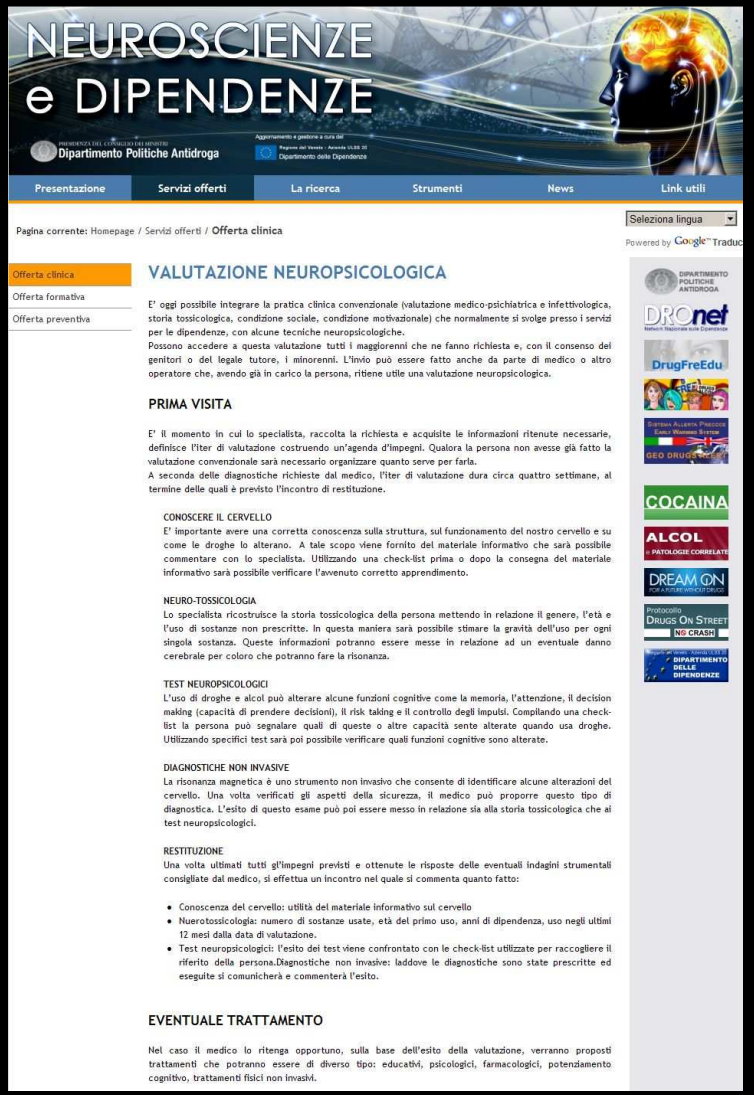
Talking about the brain

Neurotoxicology

Test

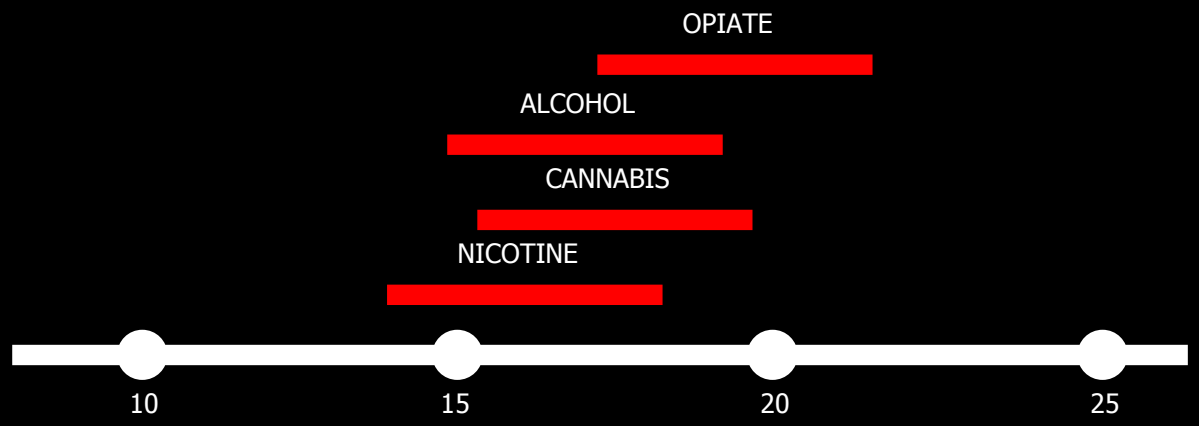
Non invasive diagnosis

Non invasive treatment



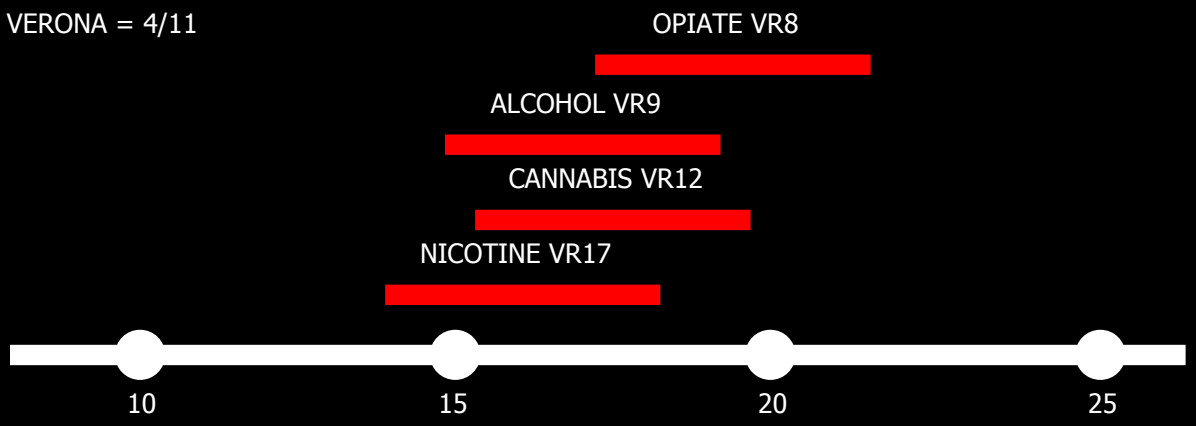
VNTS - VERONA NEURO TOX SCALE

VERONA		
0	0/365	0
1	1/365	1
2	1/180	2
3	1/150	2,4
4	1/120	3
5	1/90	4
6	1/60	6
7	1/30	12,1
8	1/15	24,3
9	1/7	52,1
10	1/6	60,8
11	1/5	73
12	1/4	91,2
13	2/7	104
14	1/3	121,6
15	1/2	182,5
16	1/1	365
17	+/1	>365



VERONA	OP	CO	AM	EC	AL	KE	IN	THC	BDZ	NI	AL
0											
1											
2											
3											
4											
5											
6											
7											
8											
9											
10											
11											
12											
13											
14											
15											
16											
17											

VERONA = 4/11



VERONA	OP	CO	AM	EC	AL	KE	IN	THC	BDZ	NI	AL
0											
1											
2											
3											
4											
5											
6											
7											
8											
9											
10											
11											
12											
13											
14											
15											
16											
17											

VERONA = 0/11

VERONA	OP	CO	AM	EC	AL	KE	IN	THC	BDZ	NI	AL
0											
1											
2											
3											
4											
5											
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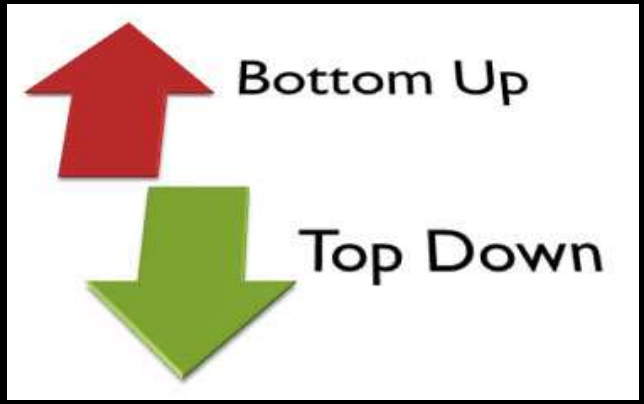
EDUCATION

Natural born ability



Natural born ability

Time out

Ignore

EDUCATION

USE-IT-OR-LOSE-IT

INHIBITION

Turn off TV

Stop to play

ACTIVATION

Go to play

Lunch time

Martirio di san Matteo

THANK YOU