Pedophilia & the Brain:
Conclusions from the 2nd Generation of Research

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Associate Professor, University of Toronto Faculty of Medicine

Child molester: An adult who engages in sexual *behavior* physically involving one or more children.

Pedophile: An adult whose primary sexual *attraction* is towards prepubescent children.

Pedophilia

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Child molester: An adult who engages in sexual *behavior* physically involving one or more children.

Pedophile: An adult whose primary sexual *attraction* is towards prepubescent children.

- Not all child molesters are pedophiles.
- Not all pedophiles are child molesters.
- Behavior versus attraction.
- Definitions use *primary* sexual attraction.

Pedophilia

Child molester: An adult who engages in sexual *behavior* physically involving one or more children.

Pedophile: An adult whose primary sexual *attraction* is towards prepubescent children.

- Pedophilia *differs* from child molestation.
- Pedophilia *motivates* child molestation.

Pedophilia

Child molester: An adult who engages in sexual *behavior* physically involving one or more children.

Pedophile: An adult whose primary sexual *attraction* is towards prepubescent children.

Pedophile:	Attraction to *pre* pubescent children.
Hebephile:	Attraction to *pubescent* children.
Teleiophile:	Attraction to *adults*.
Gerontophile:	Attraction to *the elderly*.

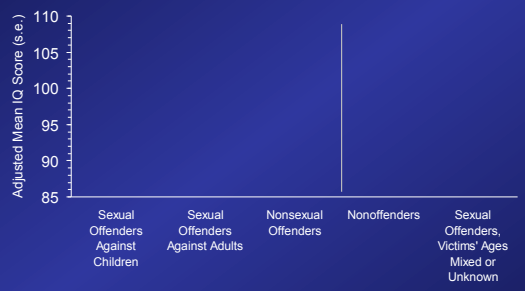
Eight decades of IQ testing

Meta-Analysis of all reports, 1931–2004

- 75 reports with IQ data
- 236 non-overlapping samples
- 25,146 cases (7,045 sexual offenders and 18,101 controls)

—Cantor, Blanchard, Robichaud, & Christensen (2005). *Psychological Bulletin, 131,* 555–568.

IQ of adult samples by victims' age group



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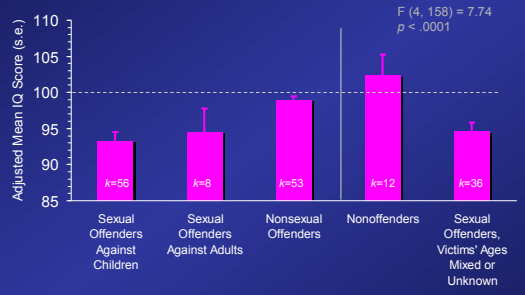

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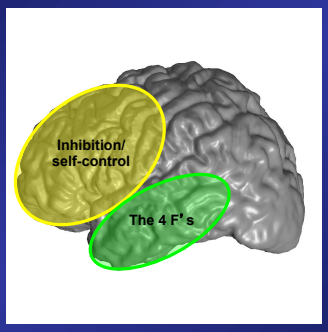
Fronta eories

Frontal Lobe vs. Temporal Lobe Theories



Individual neuropsychological tests

Trail-Making
Bowden (1987)
Cohen et al. (2002)
Dolan et al. (2002)
Knox-Jones (1994)
Langevin et al. (1989)
Stone & Thompson (2001)
Tarter et al. (1983)
Yeudall et al. (1987)

Controlled Oral Word Assoc.
Cohen et al. (2002)
Dolan et al. (2002)
Gillespie & Mckenzie (2000)
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Wisconsin Card Sort
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Wechsler Memory Scale
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Tarter et al. (1983)

Williams Verbal Learning Test
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Baker (1985)
O' Carroll (1989)
Yeudall et al. (1986)

Finger-Tapping
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Tarter et al. (1983)
Yeudall et al. (1986)

Stroop
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Wisconsin Card Sort
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Dolan et al. (2002)
Kruger & Schiffer (2011)
Miller (1997)
Rubenstein (1992)
& Thompson (2001)
ergren (2002)
all et al. (1987)

Indications of general impairment.
(Methodological confound?)
No reliable localization.

Wechsler Memory S
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Langevin et al. (1989)
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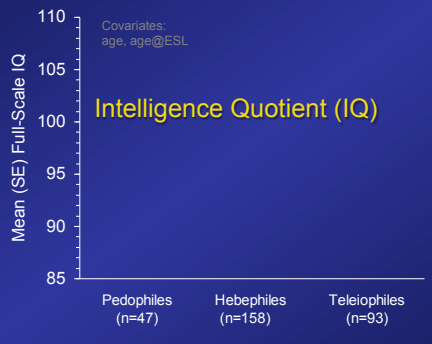
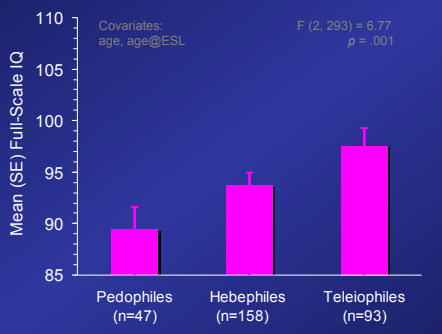
Methological Issues

- Very small samples.
- Heterogeneous offender types.
- Poorly validated (or not-validated) instruments.
- Excessive "data-mining."
- Lack of control samples.
- Very selective citation of findings.



From: Cantor, Blanchard, Christensen, Dickey, et al. (2004). *Neuropsychology, 18*, 3–14.

Intelligence Quotient (IQ)



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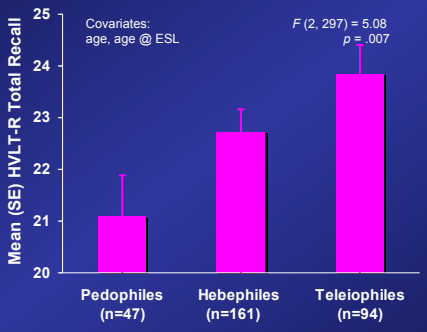
Verbal memory by phallometric group



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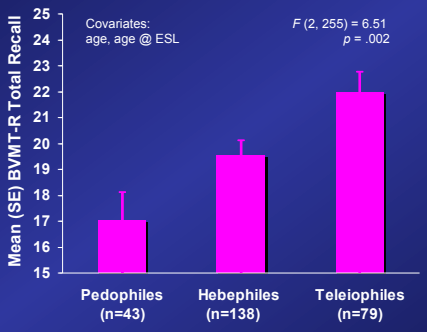
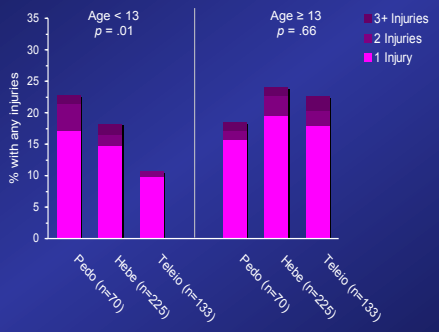
Visuospatial memory by phallometric group



—Cantor, Blanchard, Christensen, Dickey, et al. (2004). *Neuropsychology, 18*, 3–14.

Accidents causing unconsciousness



—Blanchard, Kuban, Klassen, Dickey, Christensen, Cantor, & Blak. (2003). *Archives of Sexual Behavior, 32*, 573–581.

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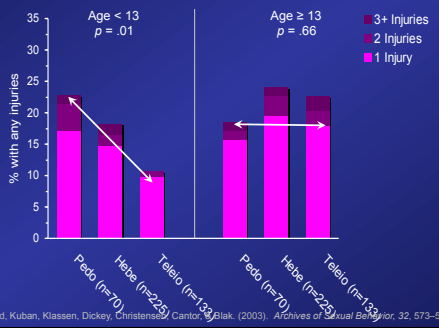
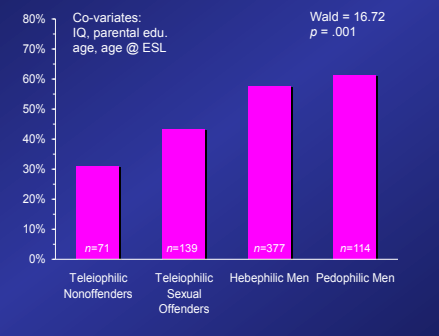


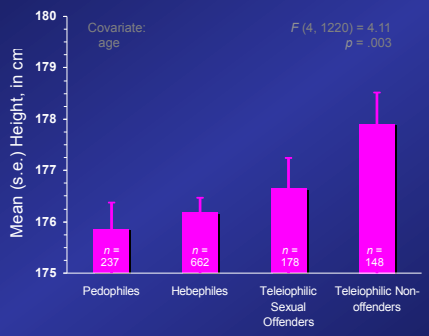
—Blanchard, Kuban, Klassen, Dickey, Christensen, Cantor, & Blak. (2003). *Archives of Sexual Behavior, 32*, 573–581.

Proportions failing or in spl. ed. by group



—Cantor, Kuban, Blak, Klassen, Dickey, & Blanchard. (in press). *Archives of Sexual Behavior.*

Physical Height



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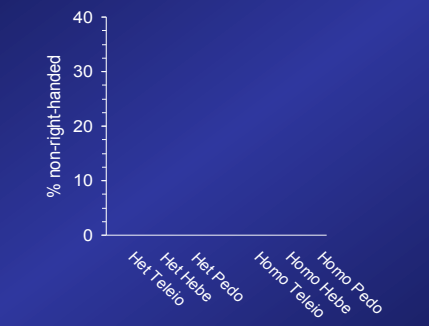
Handedness in Pedophilia and Hebephilia



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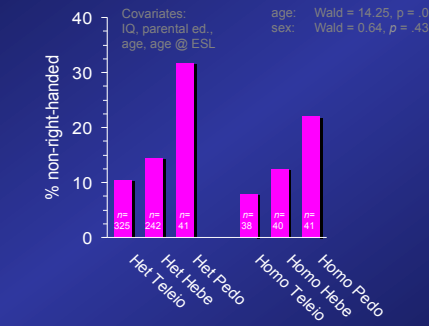
Handedness in Pedophilia and Hebephilia



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Are Brain Differences Observable *Directly?*

How we are going to attack this. In English.

- Little math or physics, some fancy slides
- Vocabulary that you really can use
- Clearing up some common confusions

Magnetic Resonance Imaging (MRI)

Current brain imaging technologies

CT	PET	MRI	fMRI
			

Can also do
DTI
(of white matter)

Current brain imaging technologies

CT	PET	MRI	fMRI
structure	function	structure	function
x-rays	radio-labeling (positrons)	magnetism (water)	magnetism (deoxy-hemoglobin)
low clarity	low clarity, 1°	1 mm^3	5 mm^3, 2°
limit exposure	limit exposure	artifacts no metal	artifacts no metal

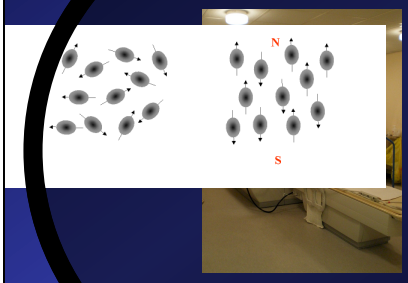
Can also do *DTI* (of white matter)

Current brain imaging technologies

MRI

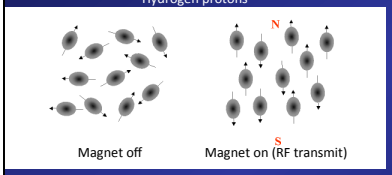
Can also do *DTI* (of white matter)

MRI Physics



MRI Physics

Hydrogen protons

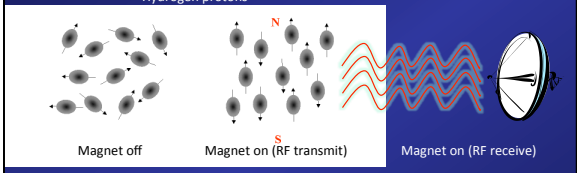


Magnet off Magnet on (RF transmit)

http://cal.man.ac.uk/student_projects/2000/mmmr7gjw/technique3.htm

MRI Physics

Hydrogen protons



Magnet off Magnet on (RF transmit) Magnet on (RF receive)

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MRI Physics

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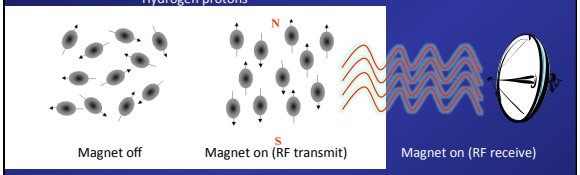
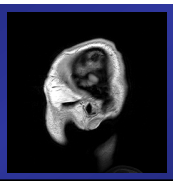


Magnet off Magnet on (RF transmit) Magnet on (RF receive)



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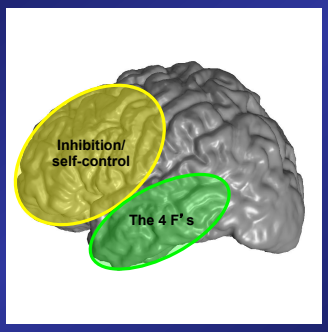
Frontal Lobe vs. Temporal Lobe Theories



Structural MRI studies of pedophilia

Study	Theory	Prediction	Subjects	Statistics
Schiltz et al. (2007)	limbic	"temporal" grey	15 pedophiles 15 community controls	small volume corrected
Schiffer et al. (2007)	OCD/ impulsivity	"frontal" grey	18 pedophiles 24 community controls	small volume corrected
Cantor et al. (2008)	atheoretical	unbiased, whole brain	65 pedophiles 62 nonsexual offenders	whole brain volume corrected

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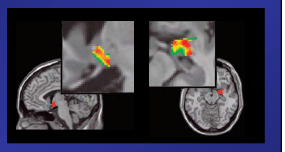

Structural MRI studies of pedophilia

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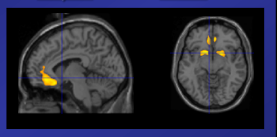

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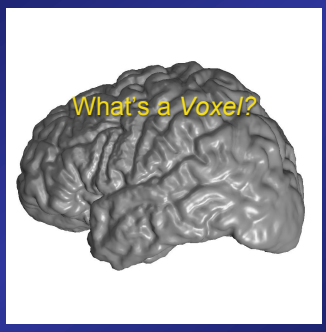
Subjects

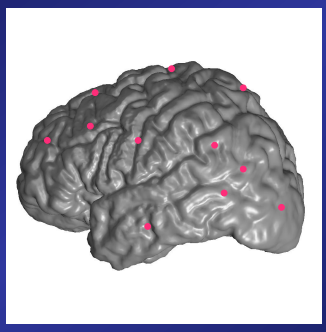
Patients
n = 65 sexology patients
Recruited from the Kurt Freund Laboratory (CAMH, Toronto)

Controls
n = 62 nonsexual offenders
Recruited from federal and provincial parole/probation offices

Exclusion criteria
<18 years age
>300 lbs weight
Ever suffered traumatic brain injury
Ever diagnosed with schizophrenia
Ever employed grinding metal
Any other metal object in body, counterindicating MRI

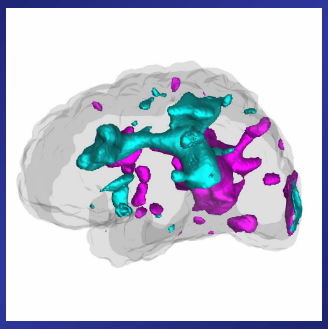


What's a *Voxel*?



VBM of Pedophilic vs. Nonsexual Offender Men

VBM of Pedophilic vs. Nonsexual Offender Men



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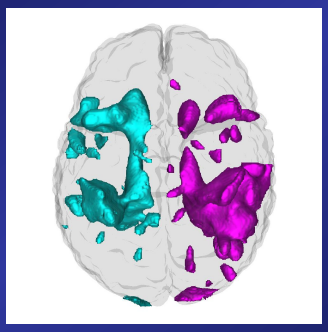
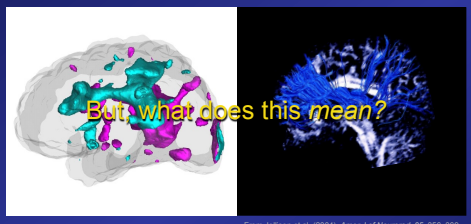
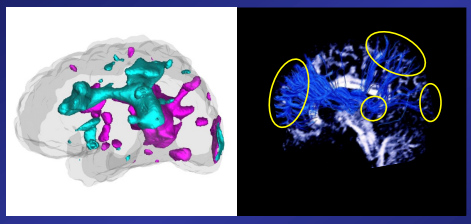




From Jellison et al. (2004). *Amer J of Neurorad, 25*, 356–369.

fMRI Studies of Sexual Arousal



Middle Frontal Gyrus	(Ferretti et al., 2005; Garavan et al., 2000; Gizewski et al., 2006; Karama et al., 2002; Montosori et al., 2003; Rauch et al., 2000)
Insula and Opercula	(Garavan et al., 2000; Gizewski et al., 2006; Karama et al., 2002; Park et al., 2001; Stoléru et al., 1999)
Sup./Inf. Parietal Lobules	(Beauregard et al., 2001; Bocher et al., 2001; Ferretti et al., 2005; Mouras et al., 2003; Stoléru et al., 2003)
Occipital Cortex	(Beauregard et al., 2001; Bocher et al., 2001; Ferreti et al., 2005; Garavan et al., 2000; Mouras et al., 2003; Park et al., 2001)

But, what does this *mean*?

1. Humans have multiple social instincts.
2. In typical men, multiple grey matter regions are networked together to identify socially significant stimuli and evoke the species-typical response:
   - Nurturance, parenting
   - Obedience, imitation
   - Sexual arousal, courtship
   - Competition, combat
   - Escape

   …etc.
3. In pedophiles, the white matter tissue is underdeveloped and connects the wrong stimulus to the wrong response.

?

So, this is where we were in 2010.

Study	Theory	Prediction	Subjects	Results
Schiltz (2007)	limbic	"temporal" grey	15 pedophiles 15 community controls	3 ROIs
Schiffer (2007)	OCD/ impulsivity	"frontal" grey	18 pedophiles 24 community controls	17 ROIs
Cantor (2008)	atheoretical	any brain, unbiased	65 pedophiles 62 nonsexual offenders	white matter (connecting "sex network")

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	replicate grey			
	replicate white			

So, this is where we were in 2010.

Replicate the Grey vs? *Replicate the White*

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Structural MRI studies of pedophilia

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Poeppl (2013)	replicate grey	3 "temporal" grey 17 "frontal" grey	9 pedophiles 11 nonsexual offenders	
	replicate white			

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	replicate white			

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What's DTI?

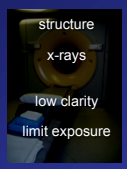
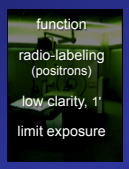
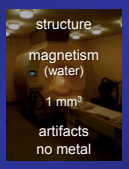
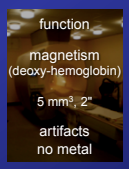
Current brain imaging technologies

CT PET MRI fMRI




Can also do
DTI
(of white matter)

Current brain imaging technologies

CT	PET	MRI	fMRI
			
structure	function	structure	function
x-rays	radio-labeling (positrons)	magnetism (water)	magnetism (deoxy-hemoglobin)
low clarity	low clarity, 1'	1 mm^3	5 mm^3, 2"
limit exposure	limit exposure	artifacts no metal	artifacts no metal

Can also do *DTI* (of white matter)

Structural MRI studies of pedophilia

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DTI Subjects

Patients
n = 24 pedophilic sex offenders
Recruited from the Kurt Freund Laboratory (CAMH, Toronto)
Phallo responses greater to a child than either adult category
1+ sexual offenses vs. child age 14 or younger (or child porn)
No sexual offenses vs. person age 17 or older

Controls
n = 32 healthy nonoffenders
Recruited from craigslist.org

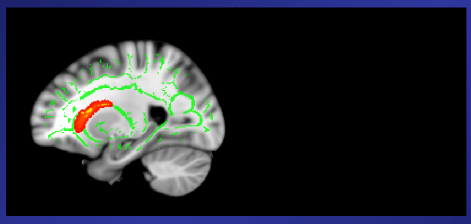
Exclusion criteria
<18 or >60 years age, …

DTI Subjects

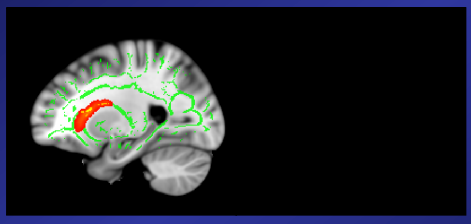
Characteristic (sd)	Pedophiles	Nonoffenders
# of participants	24	32
Age	35.6 (9.5)	37.0 (10.7)
Years of education	12.6 (2.3)***	15.3 (9.5)
IQ	100.9 (13.4)	103.5 (10.9)
non-right-handed	19%	9.3%
Levenson Psychopathy Scale	51.2 (13.0)*	44.7 (8.5)
Conflicts Tactics Scale	23.4 (17.7)*	13.5 (8.4)
Widom Childhood Neglect Index	3.3 (3.9)	2.5 (3.1)
Phallometric Pedophilia Index	1.62 (1.36)***	-1.50 (1.07)
CAGE	1.06 (1.4)	0.5 (1.0)

***$p<0.001$ *$p<.05$

DTI Results 1: Locate Main Cluster



DTI Results 2: Follow those tracts



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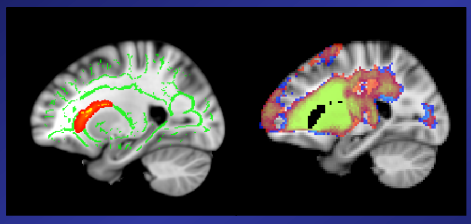

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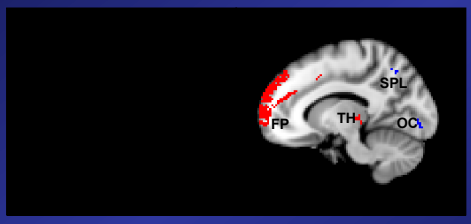
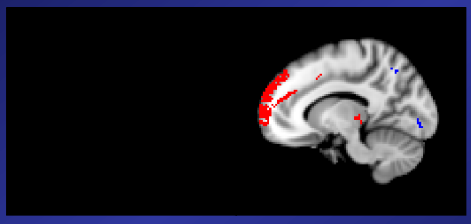


DTI Results 2: Now, what does *that* mean?



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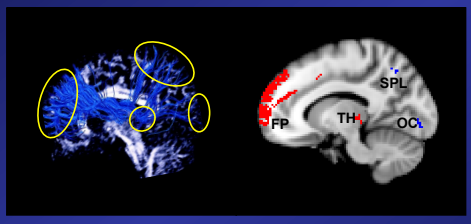

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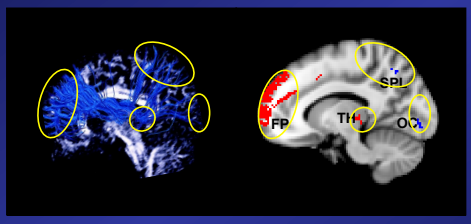

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The score

Replicate the Grey

Replicate the White

CT PET MRI *f*MRI




functional MRI (*f*MRI)

Can also do
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*f*MRI

function

magnetism
(deoxy-hemoglobin)

5 mm^3, 2"

artifacts
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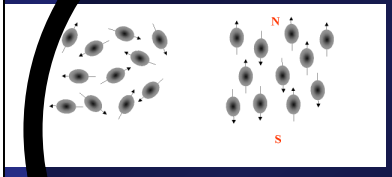
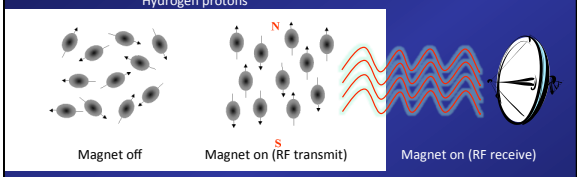
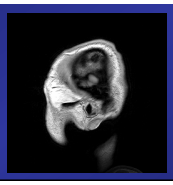


functional MRI (*f*MRI)

Hydrogen protons



Magnet off | Magnet on (RF transmit) | Magnet on (RF receive)



http://cal.man.ac.uk/student_projects/2000/mmmr7gjw/technique3.htm

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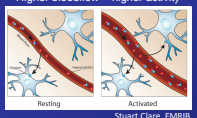
Voxels grouped by their increasing/decreasing together.
Subject performs two+ tasks, including a control task.
Analyses "subtract" states, reflecting differences in activity.

Higher bloodflow = higher activity



Stuart Clare, FMRIB

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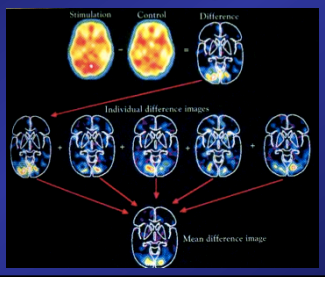

Posner & Raichle, *Images of Mind*

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"The present results indicate functional dysconnectivity within brain regions that serve to identify sexually relevant stimuli. This confirms the dysconnectivity hypothesis proposed by Cantor et al. [2008]."
!!!!!

The score

Replicate the Grey *Replicate the White*

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How do pedo- & teleio- processing differ?

Study	Anatomy	Subjects	Results
Walter (2007)	whole brain	pedophiles, healthy controls	pedophiles respond analogously to controls
Schiffer (2008a)	whole brain	homosexual pedophiles, healthy gay men	pedophiles respond analogously to controls
Schiffer (2008b)	whole brain	heterosexual pedophiles, heterosexual controls	no pedophilic responses
Poeppl (2011)	whole brain	pedophiles, nonsexual offenders	pedophiles respond analogously, but > controls
Habermeyer (2013)	whole brain	8 het pedophiles, 8 het controls	pedophiles respond part analogous, "heterogenus"
Ponseti (2014)	whole brain	het/homo pedo/teleio	pedophiles respond to face analogously to controls
Knott (2016)	(ERP, not fMRI)	22 pedophiles (SCID dx?) 22 controls	pedophiles respond less then controls

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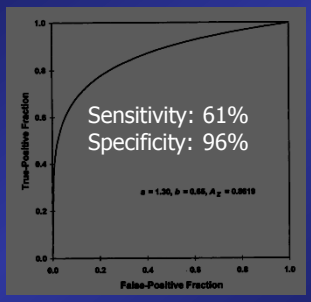
Can fMRI diagnose like PPG?

Study	Anatomy	Subjects	Results
Sartorius (2008)	amygdala centre	homosexual pedophiles heterosexual controls	≈67% sens; ≈67% spec. w/ *admitters*
Ponseti (2012)	empirical subset	24 pedophiles 32 controls	88% sens; 100% spec. (faces) w/ *admitters*
Ponseti (2016)	whole brain	24 pedophiles 32 controls	91% sens; 95% spec (faces) w/ *admitters*

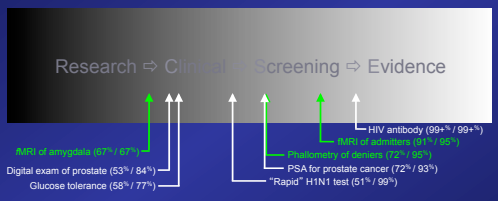
The State of the Art

Research ⇨ Clinical ⇨ Screening ⇨ Evidence

Validity of Phallometry



So, can fMRI detect arousal to child stimuli?



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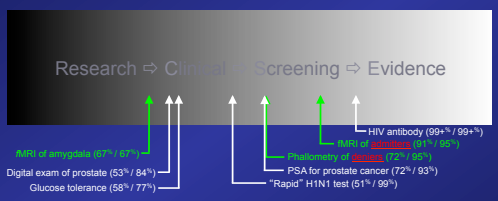

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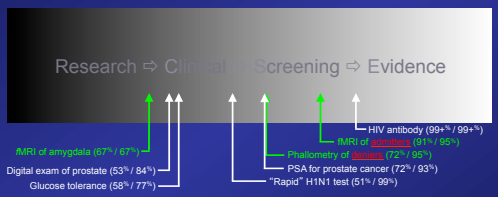

Getting close.

Towards a Grand Unified Theory

Pedophilia/hebephilia
Fetishism, vorarephilia, urophilia, acrotomophilia, autogynephilia, …

Hypersexuality
- Avoidant Masturbation
- Paraphilic Hypersexuality
- Chronic Adultery
- (sexual guilt, designated patients)

Asexuality
- Distinct from hypoactive and loss of sexual desire.

Summary

Does pedophilic processing differ from teleiophilic processing? N
Can *f*MRI serve the same function as a phallometric test? ?Y

- Overall features suggest early (*pre-natal*) origins
- Pedophilic *brain structure slightly different* from typical
- Brain differences *not consistent with what changes* with therapy, surgery, or current stem cell research
- Pedophilic brain "lights up" *in same pattern as non-pedophiles* (pedophiles respond to stimuli of children rather than adults)

The Public Response

- The Media
- Right-wing
- Left-wing
- Boychat, girlchat
- Virtuous Pedophiles

These slides (and more) available at:

JamesCantor.org