Brain Research and Pedophilia:
What it means for assessment, treatment, and policy

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Presentation available at http://individual.utoronto.ca/james_cantor
The Big Questions

Is it in the brain?

Can it change?

Is it in the genes?

Can we treat it?

Does it run in families?

Were they born with it?

Can they responsible for it?

Can we prevent it?
Sexual Offending and the Brain: History

1886  Founding of modern sexology
1900–2000  Large scale studies of forensic samples
1980–1999  Neuropsych testing, early imaging (CT) studies
1999  First neuroimaging study of sexual arousal
2000–  Large-scale studies of homogeneous samples
2007–2008  High-resolution studies of pedophilia published
2007  First fMRI studies of pedophilia published
Richard von Krafft-Ebing (1840–1902)

Psychopathia Sexualis (1886)

Sexual anomalies are a “diseased condition of the central nervous system” (p. 61).
IQ Findings

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)

IQ of Adult Samples by Victims’ Age Group

F (4, 158) = 7.74
p < .0001

IQ by Definition of “Child” Victim

$r (29) = .50$
$p = .005$

Frontal Lobe vs. Temporal Lobe Theories
Frontal Lobe vs. Temporal Lobe Theories

Inhibition/self-control

The 4 F’s
Neuropsychological Batteries

Halstead-Reitan Battery

Yeudall (1977)  Rapists
Yeudall et al. (1979)  Heterogeneous
Langevin et al. (1985)  Sadists
Langevin et al. (1988)  Sexual killers, aggressives
Langevin et al. (1989)  Exhibitionists

Luria-Nebraska Battery

Graber et al. (1982)  Heterogeneous
Scott et al. (1984)  Offenders vs. children, adults
Hucker et al. (1986)  Pedophiles
Hucker et al. (1988)  Sadists, sexual aggressives
Langevin et al. (1988)  Sexual killers, aggressives
Galski et al. (1990)  Heterogeneous
Neuropsychological Batteries

Indications of general impairment.
No reliable localization.
## Individual Neuropsychological Tests

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<td>Wechsler Memory Scale</td>
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<td>Williams Verbal Learning Test</td>
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Individual Neuropsychological Tests

Indications of general impairment. (Methodological confound?) No reliable localization.
<table>
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<th>CT studies</th>
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<td>Langevin et al. (1988)</td>
<td>Incest offenders</td>
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<td>Langevin et al. (1989)</td>
<td>Pedophiles</td>
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<tr>
<td>Wright et al. (1990)</td>
<td>Offenders vs. women, pedophiles, incest offenders, nonsex offenders</td>
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</table>
Early Brain Imaging

CT studies
Early Brain Imaging

Indications of diffuse neuropathy. No reliable localization.
Contemporary Neuropsychology and Biometrics
Pedophiles (n=47)
Hebephiles (n=158)
Teleiophiles (n=93)

Mean (SE) Full-Scale IQ

Covariates:
age, age@ESL

F (2, 293) = 6.77
p = .001

Verbal Memory by Phallometric Group

Covariates:
age, age @ ESL

$F(2, 297) = 5.08$
$p = .007$

Visuospatial Memory by Phallometric Group

![Bar chart showing mean BVMT-R Total Recall for different groups.](chart.png)

Covariates:
- age, age @ ESL

\[ F(2, 255) = 6.51 \]
\[ p = .002 \]

Proportions Failing or in Special Ed. by Group

Co-variates:
IQ, parental edu.
age, age @ ESL

Wald = 16.72
p = .001

Accidents Causing Unconsciousness

Pedophiles
Hebephiles
Teleiophilic Non-offenders

Mean (s.e.) Height, in cm

Covariate: age

$F(4, 1220) = 4.11$
$p = .003$

Handedness in Pedophilia and Hebephilia

Covariates: IQ, parental ed., age, age @ ESL

age: Wald = 14.25, p = .0008
sex: Wald = 0.64, p = .43

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Pedophilic men demonstrate:

- Lower IQs
- Lower scores on memory tests
- More frequent grade failure
- Less physical height
- Less right-handedness

Consistent indications of general impairment in:

large samples of
homogeneous offenders (pedophiles) with
phallometric data.
Are Brain Differences Observable *Directly*?
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<th>Theory</th>
<th>Prediction</th>
<th>Subjects</th>
<th>VBM Analysis</th>
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<td>15 pedophiles 15 community controls</td>
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Schiffer et al. (2007) conducted a study focused on OCD and impulsivity. Their theory predicted changes in frontal regions. They compared 18 pedophiles to 24 community controls. Their VBM analysis showed small volume changes in the frontal areas.
Junk Data or Blind Monks?
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<td>none</td>
<td>65 pedophiles</td>
<td>whole brain volume corrected</td>
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<td></td>
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<td></td>
<td>62 nonsexual offenders</td>
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Procedures

Sexological Measures

- Phallometry
- Self-report, offense history

MRI Measures

- Automated parcellation
- Voxel-based morphometry (VBM)
What’s a “voxel”?
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

## Subjects

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Patients</th>
<th>Controls</th>
<th>Comparison</th>
<th>( p )</th>
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<tbody>
<tr>
<td>Age</td>
<td>36.4 (13.5)</td>
<td>36.9 (9.4)</td>
<td>( t (125) = -0.23 )</td>
<td>.82</td>
</tr>
<tr>
<td>Full-Scale IQ</td>
<td>96.2 (15.3)</td>
<td>96.3 (11.5)</td>
<td>( t (125) = -0.03 )</td>
<td>.98</td>
</tr>
<tr>
<td>Education</td>
<td>12.2 (3.0)</td>
<td>12.1 (2.8)</td>
<td>( t (125) = 0.20 )</td>
<td>.84</td>
</tr>
<tr>
<td>CAGE alcohol screen</td>
<td>1.1 (1.4)</td>
<td>2.1 (1.6)</td>
<td>( t (125) = -3.8 )</td>
<td>.0003</td>
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<tr>
<td>% non-right-handed</td>
<td>23.1%</td>
<td>14.5%</td>
<td>( \chi^2 (1) = 1.52 )</td>
<td>.22</td>
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VBM of Pedophilic vs. Nonsexual Offender Men

VBM of Pedophilic vs. Nonsexual Offender Men

Superior Occipitofrontal Fasciculus

(right) Arcuate Fasciculus

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.
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Why didn’t Schiltz and Schiffer find white matter?

Why didn’t Cantor find grey matter?
### Towards Understanding the Contradictions

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Towards Understanding the Contradictions

- Striatum
- Hypothalamus
- Amygdala
- Orbitofrontal cortex
- Prefrontal cortex
- Anti-Sociality
- Fronto-occipital fasciculus
- Arcuate fasciculus
- Cerebellar vermis
- Corpus callosum
- Hippocampus
- Adverse Childhood Events
- Pedophilia
- Adverse Childhood Events

- Arcuate fasciculus
- Fronto-occipital fasciculus
- Cerebellar vermis
- Corpus callosum

- Striatum
- Hypothalamus
- Amygdala
- Orbitofrontal cortex
- Prefrontal cortex

- Anti-Sociality

- Pedophilia

- Adverse Childhood Events
So, can an MRI detect pedophilia?

Yes, in groups.

But...there is still disagreement over which anatomy.

No (or not yet), in individuals.

But...there is also *functional* brain scanning (fMRI).
Subject performs two+ tasks, including a control task.

Higher bloodflow = higher activity

Stuart Clare, FMRIB
Subject performs two+ tasks, including a control task. Use “subtractive” statistics to compare activity between tasks.
Subject perform two+ tasks, including a control task. Use “subtractive” statistics to compare activity between tasks.

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<th>Anatomy</th>
<th>Subjects</th>
<th>Results</th>
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<td>Walter et al.</td>
<td>whole brain</td>
<td>pedophiles, healthy controls</td>
<td>pedophiles respond analogously to controls</td>
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<tr>
<td>Schiffer et al.</td>
<td>whole brain</td>
<td>homosexual pedophiles, healthy gay men</td>
<td>pedophiles respond analogously to controls</td>
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<td>Schiffer et al.</td>
<td>whole brain</td>
<td>heterosexual pedophiles, heterosexual controls</td>
<td>no pedophilic responses</td>
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<tr>
<td>Poepppl et al.</td>
<td>whole brain</td>
<td>pedophiles, nonsexual offenders</td>
<td>pedophiles respond analogously, but &gt; controls</td>
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<td>(2011)</td>
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<tr>
<td>Sartorius et al.</td>
<td>amygdala center</td>
<td>homosexual pedophiles, heterosexual controls</td>
<td>amygdala responded analogously</td>
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<td>(2008)</td>
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<tr>
<td>Ponseti et al.</td>
<td>empirical subset of brain</td>
<td>diverse pedophiles, diverse controls</td>
<td>88% sensitivity and 100% specificity</td>
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<tr>
<td>(in press)</td>
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</table>
So, can fMRI detect arousal to child stimuli?

Research ⇔ Clinical ⇔ Screening ⇔ Evidence

- fMRI of amygdala (67% / 67%)
- Digital exam of prostate (53% / 84%)
- Glucose tolerance (58% / 77%)
- fMRI of admitters (95% / 95%)
- PSA for prostate (72% / 93%)
- Phallometry of deniers (61% / 96%)
- “Rapid” H1N1 test (51% / 99%)
- HIV antibody (99+% / 99+%)
Overall features suggest early \((pre-natal)\) origins

- Pedophilic brain structure slightly different from typical

- Brain differences \textit{not consistent with what changes with therapy, surgery, or current stem cell research}

- Pedophilic brain \textit{“lights up” in same pattern} as non-pedophiles

- Pedophiles respond to stimuli of children rather than adults
The Big Questions

Is it in the brain?

Can it change?

Can we treat it?

Were they born with it?

Does it run in families?

Are they responsible for it?

Can we prevent it?
The Public’s Fears
My Fears
My Hopes

What if…?

fMRI provides the next increment in accuracy of diagnosing pedophilia and is employed only within the bounds of contemporary professional ethics:

- Informed Consent
- Confidentiality

With continued research, we pinpoint the prenatal process that goes awry.

Perhaps: A general prenatal health factor already known to interfere with normal growth of both body and brain...

Instead of preventing a second offense, we can prevent the first offense.
Magnus Hirschfeld (1868–1935)

“Justice through science”

Wissenschaftlich-humanitäres Komitee
(Scientific-Humanitarian Committee)
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Robert Brown

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Elias Constantatos
Robert Small
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