PSYCHOPATHOLOGY II

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9.00
PSYCHOPATHOLOGY

- TREATMENT
- DEPRESSION (film)
- ATTENTION DEFICIT HYPERACTIVITY DISORDER (ADHD) (film)
TREATMENT

• Behavioral Therapy (Psychotherapy)
  Psychoanalysis
  Cognitive Behavioral Therapy (CBT)
• Psychopharmacology
Psychotherapy is a social interaction in which a trained professional tries to help another person behave and feel differently.
Who Provides Psychotherapy?

Image of telephone directory pages removed due to copyright restrictions.

Includes listing headings for Psychics, Psychoanalysts, Psychologists, and Psychotherapists.
Psychiatrist
Psychoanalyst

Freud & his couch, 1932

Courtesy of the Freud Museum, Vienna. Used with permission.
Other sources of psychotherapy

- Clinical Psychologist
- Counseling Psychologist
- Clinical Social Worker
- Clergy
- Peer Groups (e.g. AA)
- Self-help
Sigmund Freud
(1856-1939)
Types of Psychotherapy

- Psychodynamic
  - Free association
  - Resistance
  - Transference
  - Interpretation
  - Corrective emotional experience
Aaron Beck
Born 1921

COGNITIVE BEHAVIORAL THERAPY - CBT

- Dysfunctional beliefs
- Logical errors in thinking maintain beliefs
- Focus on current problems; strategies to help
- Time-limited

Courtesy of Aaron T. Beck, M.D.. Used with permission.
Does Psychotherapy Work?

- Initial pessimism (Eysenck 1952)
- Cautious optimism (Smith, Glass, & Miller, 1980)
Meta-Analysis

• Quantitative method for averaging results of a large number of different studies.

• Unit of analysis is the **effect size**, arrived at by subtracting the mean of the control group from the mean of the treatment group and dividing that difference by the standard deviation of the control group.

• The larger the effect size, the greater the effect of therapy.
CONTROL

TREATED

50th %-ILE
OF CONTROL

75th %-ILE
OF CONTROL

AVERAGE EFFECT SIZE: 0.68 σₓ

STD. DEV. OF EFFECT SIZE: 0.67 σₓ

Meta-Analysis of Psychotherapy Effectiveness
(Smith, Glass, & Miller, 1980)

• The average person (50th %ile) receiving psychotherapy was better off than 80% of the persons who did not receive therapy.

• Only about 10% of effect sizes were negative → deterioration due to psychotherapy was infrequent.

• Different types of therapy were equally effective, but some advantage to cognitive and behavioral therapies.
WHEN DOES PSYCHOTHERAPY WORK?

Random assignment

Psychotherapy
  - Wait-list
  - Blind and double-blind

Meta-analysis of good efficacy of psychotherapy studies
  - 2:1 chance of improvement vs. control
  - Credentials (Ph.D., M.D., no degree) did not matter
  - Experience of therapist did not matter
  - Type of therapy did not matter
  - Length of therapy did not matter
Twelve current psychiatric medications (e.g. Zoloft, Paxil, Depakote): photo of pill, how it works, side effects, and testing/approval status.

Cover: “Are We Giving Kids Too Many Drugs?”
Story: “Medicating Young Minds”
Obsessive Compulsive Disorder (OCD)

• anxiety disorder
• obsessions - recurrent, unwanted thoughts
• compulsions - repetitive behaviors
  handwashing, counting, checking, cleaning

http://www.youtube.com/watch?v=Rn1OYiYzgm8
OCD Treatment Study Results

Effectiveness of Antipsychotic Medications and Therapy


Percent relapse in the first year after treatment:
- Medication only: 40%
- Medication + Social skills: 20%
- Medication + Family therapy: 20%
- Medication + Social skills and family therapy: 0%
Basal ganglia shows similar changes with psychotherapy and drug therapy.
Depression: Brain Activity after CBT and Medication Treatments

Different therapies produce different brain activity results. (Orange = increased activity; blue = decreased activity)
DEPRESSION

• fearful, gloomy, helpless, hopeless
• Hamlet "How weary, stale, flat, and unprofitable seem to me all the uses of this world"
• Typical episode is 4-12 months (if untreated) - pervasive dysphoria - intense mental pain, anhedonia (inability to feel pleasure), generalized loss of interest
• 5% of world's population - 8 million in U.S.
• average age of onset is 30, but wide spread - often unnoticed in young - rare to have first episode after 60
• women 2 or 3 times the rate of men
• about 70% who have an episode will have another
• diagnosis requires also at least 3 of the following for a period
  – disturbed sleep
  – diminished appetite
  – loss of energy
  – decreased sex drive, restlessness
  – slow thoughts/actions
  – poor concentration, indecisiveness
  – feelings of worthlessness
  – guilt
  – pessimism
  – fixation on death or suicide

• Genetic predisposition: Monozygotic twin concordance = 50%; dizygotic = 10% (same as siblings); Environmental - since 1940, a nearly 10-24 year drop in average age of first incidence
DEPRESSION

• dot probe task of attentional allocation
  - biased attention to sadness in depression
  - risk for depression or consequence of depression?
Attentional Biases for Sad, Angry, and Happy Faces

Diagnostic Group

- Depressed
- Anxious
- Control

Bias Score (msec)

- Sad Faces
- Angry Faces
- Happy Faces

Courtesy of Ian Gotlib. Used with permission.
Attentional Biases for Sad and Happy Faces in High-Risk and Low-Risk Girls
This PET scan was also produced by subtracting scans of normal subjects from scans of depression patients. It reveals a tiny area buried deep along the midline in the frontal lobe (also known as the orbitofrontal cortex because of its position just above and behind the eyes) which may play a key role in the symptoms of depression. Here it exhibits reduced metabolism in patients with depression.
REDUCED BRAIN VOLUME IN DEPRESSION IN SUBGENUAL ANTERIOR CINGULATE

REDUCED NUMBER OF GLIAL CELLS IN SUBGENUAL ANTERIOR CINGULATE CORTEX IN DEPRESSION (no change in neurons)

RELATION OF ACTIVATION IN SUBGENUAL ANTERIOR CINGULATE CORTEX TO DRUG TREATMENT OUTCOME

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PREDICTING CBT OUTCOME IN DEPRESSION

A. Region Examined
Subgenual Cingulate Cortex

B. Relationship Between Regional Reactivity to Negative Words and Residual Depressive Severity Following Treatment With Cognitive Behavior Therapy

C. Regional Reactivity to Negative Words in Patients With Unipolar Depression, by CBT Response Status, Relative to Healthy Comparison Subjects

Source: Siegle, G. J., et al. "Use of fMRI to Predict Recovery From Unipolar Depression With Cognitive Behavior Therapy." Am J Psychiatry 163 (2006): 735-8. © American Psychiatric Association. All rights reserved. This content is excluded from our Creative Commons license. For more information, see http://ocw.mit.edu/fairuse.
Treatment for Depression

• medications (27 million people in US 2005, $9.6 billion in 2008 sales)
• CBT
Current Treatment for Depression is Suboptimal

• Only partially effective
  As many as ½ of patients do not achieve remission (Petersen et al., 2005)
  Residual symptoms are common among patients achieving remission (Nierenberg, 1999)

• Trial and Error
  Selecting correct treatment takes months, causing attrition
Treatment for Depression

- clinical trials
  - drug – random assignment, double-blind with placebo
  - outcome – response vs. remission
  - interviews – physician – Hamilton Depression Rating Scale

  *strong placebo response*

  regression to the mean from study entry?
  real response to placebo?
Treatment for Depression

recent meta-analyses

• Kirsch – no effect of drug (above placebo, about 75% of effect) – apparent difference is due to patients realizing they are on active drug from side effects – greater side effects associated with better drug response (80% of patients guess correctly they are on drug) – no drug/placebo difference if placebo causes side effects

• Fournier – little or no drug benefit above placebo for mild-to-moderate or severe depression; benefit for patients with very severe depression
ATTENTION DEFICIT DISORDER (ADHD/ADD)

- INATTENTION
- HYPERACTIVITY (80%)
- IMPULSIVITY
- DIAGNOSIS by exclusion
- PREVALENCE 2 million in US tripled since 1981 increased 2.5 times since 1990
How Do Clinicians Make The Diagnosis?

- History from parents and physical exam
- Collection of data from school and parents using questionnaires
Prevalence of ADHD

- Ranges from 1.7 to 16.1% in various studies
- Different diagnostic methods have been used to establish the prevalence
- Different DSM manuals - DSM III, DSM IIIR, and now DSM IV
- Different settings - by country, by profession
- Wolraich – same German population, incidence changed from 6 to 12% DSM 3R to DSM 4
Attention Deficit Hyperactivity Disorder (ADHD)

• PREVALENCE: 3 - 5% of school-age children

• Impairs social and academic adjustment in childhood
  - predicts antisocial behavior, substance abuse
  and adverse occupational and social adjustment in adulthood

• TREATMENT: Stimulants, e.g. methylphenidate (Ritalin)

• ETIOLOGY: genetic
  - rates among relatives of probands - 7 times
  - twin studies - .76 heritability
  - candidate genes - dopaminergic
• **INATTENTION** (> 6 for at least 6 months to a degree that is maladaptive and age-inappropriate)
  - careless mistakes in schoolwork or other activities
  - difficulty sustaining attention in tasks or play
  - does not seem to listen when spoken to directly
  - does not follow instructions or finish tasks
  - difficulty organizing tasks and activities
  - avoids tasks engaging sustained mental effort
  - loses things
  - easily distracted by extraneous stimuli
  - forgetful in daily activities
• **HYPERACTIVITY-IMPULSIVITY** (> 6 for at least 6 months to a degree that is maladaptive and age-inappropriate)

**Hyperactivity**
- fidgets or squirms in seat
- leaves seat in classroom
- runs about or climbs excessively
- difficulty playing quietly
- is “on the go” or acts as if “driven by a motor”
- talks excessively

**Impulsivity**
- blurts out answers before questions are completed
- difficulty awaiting turn
- interrupts or intrudes on others’ conversations or games
• Symptoms present before age 7 years

• Symptoms present in 2 or more settings (home/school)

• Diagnosis by exclusion of following:
  - pervasive developmental disorder
  - sensory deficits
  - allergies
  - psychiatric conditions that “mimic” ADHD e.g., depression

• Subtypes -
  - Combined-type - both inattention and hyperactivity-impulsivity
  - Inattention-type - inattention only
  - Hyperactive-impulsive - hyperactivity-impulsivity only
Long-term consequences

If untreated -> secondary problems:

• depression
• anxiety
• substance abuse
• academic failure
• work problems
• family problems
• emotional distress
Multimodal Treatment Study of Children with Attention Deficit Hyperactivity Disorder (MTA)

579 children – 14 month study
(1) medication management alone;
(2) behavioral treatment alone;
(3) a combination of both; or
(4) routine community care
MTA Study

(1) medication management alone; monthly 30 min physician - titration - child/parent

(2) behavioral treatment alone; 35 visits; 8-week summer camp

(3) a combination of both; or

(4) routine community care 1-2 times/year
MTA Study

Best Outcomes

medication management alone or a combination of both

some gains for combined on anxiety, academic performance, oppositionality, parent-child relations, and social skills; lower doses of medications
MTA Study

- 8 years later no difference
- 61.5% stopped taking medication
- no difference between those who did or did not stop taking medications
BEST DOSE?

Sprague and Sleator, Science, 1977
Regions where the ADHD group had delayed cortical maturation, as indicated by an older age of attaining peak cortical thickness.

Nucleus Accumbens recruited by anticipation of responding for a reward versus nonreward

Courtesy of Brian Knutson. Used with permission
Gain anticipation activates Nucleus Accumbens

anticipated gain ($ vs 0)

anticipated loss ($ vs 0)

Courtesy of Brian Knutson. Used with permission
Mesolimbic Dopamine Projections

Knutson, B., and S. E. B Gibbs (2007) *Psychopharmacology*

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Gain outcomes activate MPFC

gain outcome ($ vs 0)  loss outcome (0 vs $)

Courtesy of Brian Knutson. Used with permission
LESS RESPONSE TO REWARD ANTICIPATION IN ADHD

GREATER RESPONSE TO REWARD OUTCOME IN ADHD

Treatment With Psychostimulants Does Not Slow Development Of Cerebral Cortex

Questions

• Does brain function differ in ADHD and control children?

  Do brain regions involved in inhibitory control function differently in children with ADHD?

• Does Ritalin have different effects on brain function in ADHD and control children?

  • Treatment by stimulants (e.g. Ritalin)
  • Brain changes that mediate effectiveness are unknown
  • Effects in control children are unknown
## Participants

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<th></th>
<th>Age (yrs)</th>
<th>WISC IQ</th>
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<tbody>
<tr>
<td></td>
<td></td>
<td>Verb</td>
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<tr>
<td>ADHD</td>
<td>Mean</td>
<td>10.5</td>
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<tr>
<td><strong>n = 10</strong></td>
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<td></td>
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<tr>
<td>Control</td>
<td>Mean</td>
<td>9.3</td>
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<tr>
<td><strong>n = 6</strong></td>
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Go-No-Go Task

Go
25 s

No-Go
25 s

Go
25 s

No-Go
25 s

6 cycles
5 mins

“Respond to all letters”

“Do not respond to X”

.5 sec exposure
1.4 sec ISI

50 %

12

12
Functional Scanning Parameters

- 1.5 T GE
- Gradient Echo Spiral Pulse Sequence
- TR/slice = 90 ms, TE = 40 ms
- Flip angle = 65
- 4 interleaves
- FOV = 36 cm
- 8 coronal slices: 6 mm thick
  1 mm inter-slice space
- Continuous acquisition for 300 s
- In-plane resolution: 2.35 mm
- Image acquisition = 2.88 sec
- Bite-bar to minimize motion
- Time-series data analysis: Friston et al., 1994
Effect of Ritalin on Performance

Failures of Response Inhibition

Ritalin improved performance in both groups.
Activation during No-Go blocks in controls on-Ritalin

$z = 1.96$
Activation during No-Go blocks in ADHD off-Ritalin
Activation during No-Go blocks in ADHD on-Ritalin

\[ z = 1.96 \]
Regions of Interest

slice +12
Frontal Lobe Regions

Superior Frontal Gyrus

Middle Frontal Gyrus

Inferior Frontal Gyrus

Orbital Frontal Gyrus

Ant. Cingulate Gyrus

Ritalin

OFF

ON
Brain structures implicated in ADHD
Dopaminergic pathways

- Prefrontal cortex
- Nucleus accumbens
- Ventral tegmental area

Source: NIH
A
Brain activation during impulse control

OFF-RITALIN  ON-RITALIN
ADHD

Control

B
Caudate  Putamen

Percent of Pixels

Control  ADHD  Control  ADHD

C
Errors in impulse control

Ritalin
OFF  ON

Percent False Alarms

Control  ADHD
to what extent is variation “pathologized”? how should people pursue happiness?

- height and human growth hormone? (men, 5’9”; women 5’4”)
- sadness to depression?
- shyness to social anxiety disorder?
- failure to follow directions to ADHD?

- use of stimulants to enhance performance – 7% of university students? 20% of scientists in on-line poll

- ethics – what is the right thing? also fairness, freedom, long-term risks?