

Ch. 15: New directions

Copyright © 2023 Michael Diehr
All Rights Reserved
For use only by students enrolled
in my sections of Psyc 402
through the end of the semester.
May not be posted, shared or uploaded
online without permission.

1818

Psychology 402 - Fall 2023 - Dr. Michael Diehr

1819

Psychology 402 - Fall 2023 - Dr. Michael Diehr

New directions

- New Theory
 - Cognitive-behavioral
- New Computerized Test & Tools
 - Psychophysiology
 - Traditional Test administration
 - Computer-Aided Interview
 - Computer-Administered test
- Test scoring
- Internet/web-based tools

1826

Psychology 402 - Fall 2023 - Dr. Michael Diehr

Clinical Example

- 7 year old boy presents with weight loss secondary to reluctance to eat other than a few foods (cereal, PB&J, plain spaghetti)
- At age 4 he had illness for 25 days during which he could not swallow solid food
- Parents are desperate “Isn’t there some test you can give him to determine what’s wrong?”
- IQ test - high average
- Interview & projective tests suggest eating disorder is related to trauma re: illness

1827

Psychology 402 - Fall 2023 - Dr. Michael Diehr

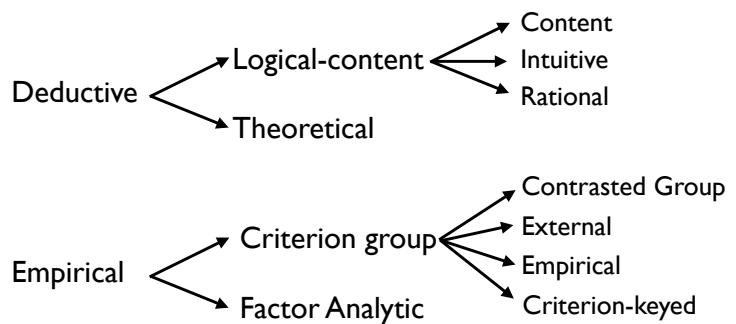
Clinical Example 2

- Medical model:
 - reluctance to eat is a symptom of deeper problem
 - find the cause and treat it, and the symptom(s) will get better
- Cognitive-behavioral model:
 - the original causes (if any) are in the past and can't be changed.
 - the eating behavior itself is the problem, and the focus of treatment.
 - the symptom IS the disorder

1828

Psychology 402 - Fall 2023 - Dr. Michael Diehr

Design Theories



1829

Psychology 402 - Fall 2023 - Dr. Michael Diehr

Clinical Example 3

- CBT set up a treatment regimen:
 - mother would monitor eating behavior
 - point system
 - rewards (toys, etc.) given for points
- Results:
 - problems greatly reduced in a few weeks.
 - treatment stopped but new (proper) eating behavior persisted

1830

Psychology 402 - Fall 2023 - Dr. Michael Diehr

Traditional vs. CBT

- Traditional assessment & testing are focused on finding patterns of psychopathology with a goal of diagnosis -- finding the cause of the illness.
- Diagnosis may lead to treatment, which may lead to cure, but this is indirect.
- In CBT, the test is a measure of the problem and also is a measure of the treatment.

1831

Psychology 402 - Fall 2023 - Dr. Michael Diehr

Psychophysiology

- Under CBT, physical measures are considered to be more “objective” or “observable”
- Examples:
 - GSR (galvanic skin response) -- sweating
 - heart rate (pulse)
 - blood pressure
 - sexual response / arousal
 - pupil dilation
- These measures can be correlated with various cognitive & emotional processes

1832

Psychology 402 - Fall 2023 - Dr. Michael Diehr

State of the art?

- Clinical Psychology has lagged in embracing computerized tests and assessment
- In 2020, many major tests are still widely given using paper & pencil versions with hand-calculated scoring
- Few standards exist for sharing clinical / research data.
- Most psychological tests are based on theories that pre-date the cognitive revolution (1960s)
- Why the slow adoption?

1833

Psychology 402 - Fall 2023 - Dr. Michael Diehr

Slow adoption of technology...

- Clinical Psychology is not a medical discipline -- pressure to standardize and cut costs has been limited
- Computer phobia? (Perhaps in researchers, but probably not in patients)
- Generational?
- Intellectual Property / profit concerns?
- Field is still young -- hasn't had breakthroughs similar to other fields (genetics, physics etc.)

1835

Psychology 402 - Fall 2023 - Dr. Michael Diehr

Aided- or Administered-

- Computer-aided tests are traditional tests given by a clinician with the computer helping sequence items and phrase questions.
- Computer-administered tests are traditional tests given entirely by computer.
- Both generally show reliability & validity equal to that of the paper & pencil tests they are based on.
- Computer-administered tests often show reduced defensiveness -- people are more willing to admit embarrassing symptoms.

1836

Psychology 402 - Fall 2023 - Dr. Michael Diehr

New computer tests

- New theories being applied:
 - cognitive / neuroscience
 - non-human animal research
 - computer science / cognitive science / AI
- New methods being used:
 - fast presentation of stimuli
 - accurate measurement of responses
 - scoring
 - adaptive tests

1837

Psychology 402 - Fall 2023 - Dr. Michael Diehr

Cognitive Psychology Theory

- Mental processes exist!
- Mental processes can be studied scientifically (by using speed or accuracy as DV's).
- Human beings are active information processors.
- Humans are not necessarily special :
 - it should be possible to deconstruct and reconstruct mental processes in other substrates (e.g. a computer)
- non-human primates and lower animals are on a continuum with humans

1840

Psychology 402 - Fall 2023 - Dr. Michael Diehr

Tools & Techniques

- Brain Imaging
 - Structural
 - CAT, MRI
 - Functional
 - PET, fMRI, MEG
- Electrophysiology
 - EEG
 - ERP

1841

Psychology 402 - Fall 2023 - Dr. Michael Diehr

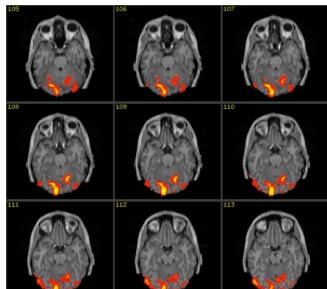
Positron Emission Tomography



1842

Psychology 402 - Fall 2023 - Dr. Michael Diehr

MRI and fMRI



1843

Psychology 402 - Fall 2023 - Dr. Michael Diehr

EEG and ERP

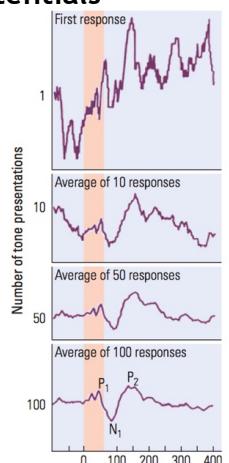
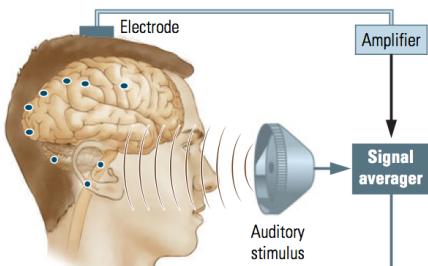


1844

Psychology 402 - Fall 2023 - Dr. Michael Diehr

ERP - Event-Related-Potentials

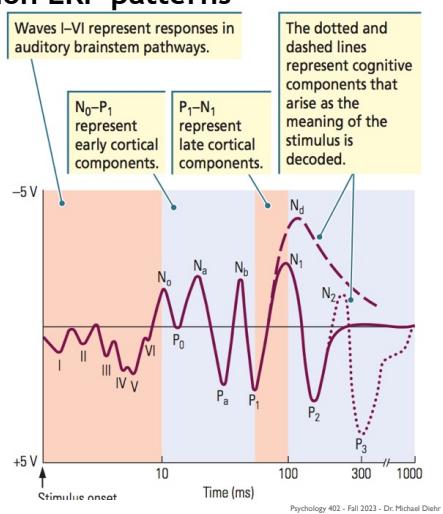
- Can you see “thinking” by watching EEG?
- In a single recording: No, it’s too noisy
- By statistically averaging multiple events, a pattern emerges



184.1

Common ERP patterns

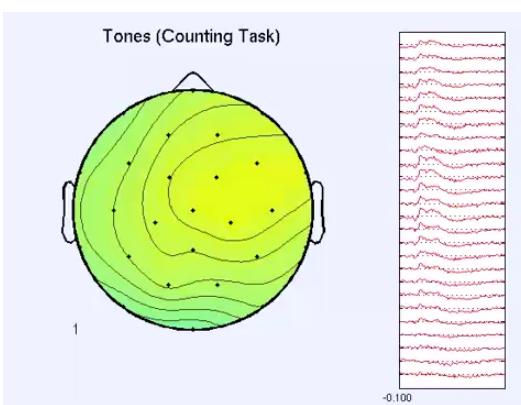
- (P)positive and (N)egative waves
- Early waves in brainstem (I, II, III, IV, V, VI)
- Later waves in cortex (N0, P0...N3, P3)
- Image: ERP in Parietal Cortex in response to spoken word



Psychology 402 - Fall 2023 - Dr. Michael Diehr

Multi-electrode ERP

An individual's event-related potentials (ERPs) to tones in a simple tone counting task. Right column plots ERPs at 26 scalp electrodes (negative is up). Voltage is represented in color on the cartoon head (cool=negative, warm=positive). Time (in seconds) is printed at the bottom of the column of ERPs. Most prominent ERP deflection is the auditory N1 that peaks around 100 ms post-stimulus.



Psychology 402 - Fall 2023 - Dr. Michael Diehr

184.3

MEG : magnetoencephalography

- Maxwell-Faraday equation - relates change in Electrical potential (voltage) “E-field” to change in magnetic field “B-field”

$$\nabla \times \mathbf{E} = -\frac{\partial \mathbf{B}}{\partial t}$$

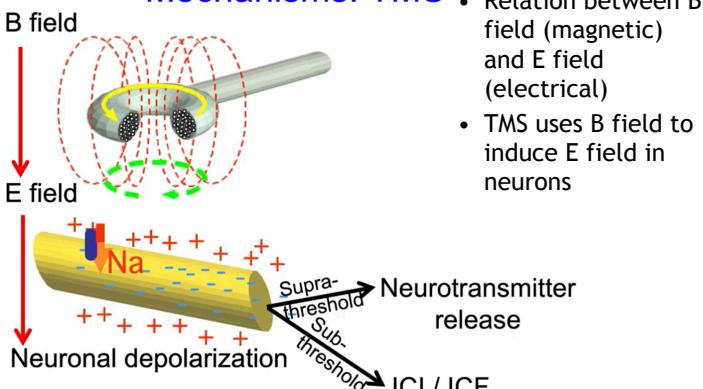
- Electrical voltages : can be measured with cheap equipment
- Magnetic fields : measured with fancy equipment
- SQUIDs : Superconducting quantum interference device
- Requires liquid helium
- \$\$\$
- Pro: higher resolution



Psychology 402 - Fall 2023 - Dr. Michael Diehr

Transcranial Magnetic Stimulation

Mechanisms: TMS



185.1

Transcranial Magnetic Stimulation

Magnetic Field Characteristics: Coil Shape

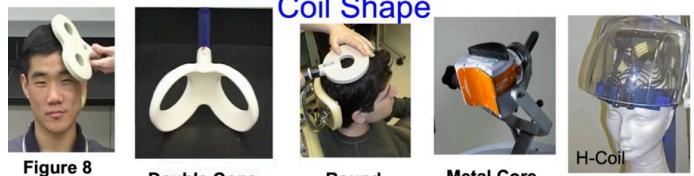


Figure 8

Double Cone

Round

Metal Core

H-Coil

Psychology 402 - Fall 2023 - Dr. Michael Diehr

Modern Trends

- Computerized Standards for Assessment
 - NIH Toolbox
- ‘mHealth’ products
 - personal / mobile hardware & software
- Machine Learning (ML), Large Language Models (LLM) and Artificial Intelligence (AI)
 - ChatGPT 4

1852

Psychology 402 - Fall 2023 - Dr. Michael Diehr

NIH Toolbox

- Attempt to make worldwide standard for neuropsychological assessment

1853

Psychology 402 - Fall 2023 - Dr. Michael Diehr

mHealth (mobile health)

- Handheld technology
- on-site rather than in hospital
- personal vs. professional



Health.
An entirely new way to use you health and fitness information.
The new Health app gives you an easy-to-read dashboard of your health & fitness data. And we've created a new tool for developers called HealthKit which allows all the incredible health and fitness apps to work together, a work harder, for you. It just might be the beginning of a health revolution.



Psychology 402 - Fall 2023 - Dr. Michael Diehr

Chat GPT

- Large Language Model (LLM) trained on much of the writing on the internet
- Issues of “hallucinations”, harmful recommendations, and bias

1858

Psychology 402 - Fall 2023 - Dr. Michael Diehr

Apple Heart Study

- Using digital watch to look for heart rhythm irregularities



1856

Psychology 402 - Fall 2023 - Dr. Michael Diehr