

# Ch. 17: Neuropsychology

- Definitions
- History
- Goals
- Methods
- State of the art
- Issues
- Demographic Norms
- Careers / Training

1078

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# Clinical Neuropsychology

- Field: Subfield of clinical psychology
- Setting: outpatient and inpatient
- Subjects/Patients: children, adolescents, adults, geriatric
- Methods: Measure function of specific brain areas & systems.
- Measures: Standard tests (IQ tests) as well as specialized test batteries
- Norms: standard, as well as specialized, normative data

1079

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## Goals of NP Assessment

- Diagnosis
  - Clinical
  - Scientific
  - Medico-legal / forensic
- Understanding of neurological basis of disorder
  - Prognosis
  - Treatment plan
    - surgical, pharmacological, psychosocial, remediation
- Track changes over time

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## Neurology v. Neuropsychology

	Neurology	Neuropsychology
Education	MD	PhD
Methods	hands on, informal	hands off, structured
Decisions	clinical judgement	statistics & norms
Focus	motor / sensory	cognitive
Psychosocial	some	much
Treatments	drugs, surgery	rehabilitation, compensation

1081

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## Behavioral tests vs. biological

- Q: Isn't it better to diagnose brain disease with biological measures (such as brain imaging) vs. giving neuropsychological tests?
- A: In many cases most sensitive test of early dysfunction is a neuropsychological test
- Example: Alzheimer's disease shows a very specific pattern of "rapid forgetting" that can be detected by memory testing, long before it shows up on brain imaging scans.
- NP testing is relatively non-invasive, though not particularly inexpensive

1082

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## Behavioral tests vs. biological 2

- Many behaviors are mediated by multiple brain systems, these systems may be distributed widely throughout the brain and/or intermixed with other systems. These types of systems are not easily imaged with MRI
- In many cases, behavior is the final issue. Therefore, testing behavior directly can be more accurate than testing biology.
- However, in many cases Imaging and Neuropsychology go hand in hand. Imaging shows the damage, NP tests show the effects.

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# Neuropsych. Batteries

- Two major schools of thought:
- Fixed Battery
  - Give all patients same set of tests
  - Increase chance of finding subtle/hidden impairments
  - Excellent statistics and normative data
- Flexible Battery
  - Tailor specific tests to specific patients
  - More like neurology, more hands on
  - Poor statistics, possible to miss hidden issues

1084

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# Fixed Batteries

- Halstead-Reitan
  - WAIS-III plus additional tests of memory, learning, motor and sensory skills
  - Approx 6 hours to administer
- Luria-Nebraska
  - Luria had a flexible battery based on theory of pluripotentiality (multiple brain systems could compensate to do the same tasks)
  - Had poor psychometrics. Test battery was improved and standardized at U. Nebraska
  - Approx 24 hours(!) to administer

1085

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# Halstead-Reitan Battery

- Full WAIS-III
- Additional tests:
  - Category test
  - Grooved pegboard
  - Rhythm
  - Speech comprehension
  - Finger tapping
  - Trail making
  - Grip Strength
  - Sensory-perceptual exam

1086

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# Gardner's 8 Intelligences

- logical-mathematical (\*)
- verbal-linguistic (\*)
- spatial (\*)
- musical
- bodily-kinesthetic
- naturalist
- interpersonal
- intrapersonal

1087

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# Limitations of NP Testing

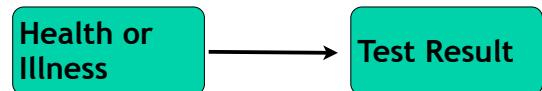
- Most tests predate modern neuroscience
- Lack of pre-test data
  - reliance on normative data
- Lack of international standardization
- Lengthy
  - 2 - 20 hours of testing
- Expensive
- Requires Ph.D. level training

1088

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# Demographic Corrections

- Normative Data would be simple if there was one definition of "normal"
- Simple model

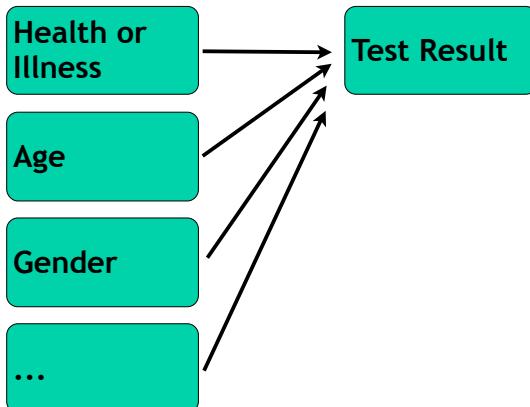


1089

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## Demographic Model

- More realistic model



1090

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## Common Demographic Covariates

- Age
- Sex
- Race/Ethnicity
- Education
- Language

1091

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## Diehr et al (2003)

- Paced Auditory Serial Addition Test
- Demographic variables:
  - ethnicity : self-identified as either White / Black
  - age
  - gender
  - education

1093

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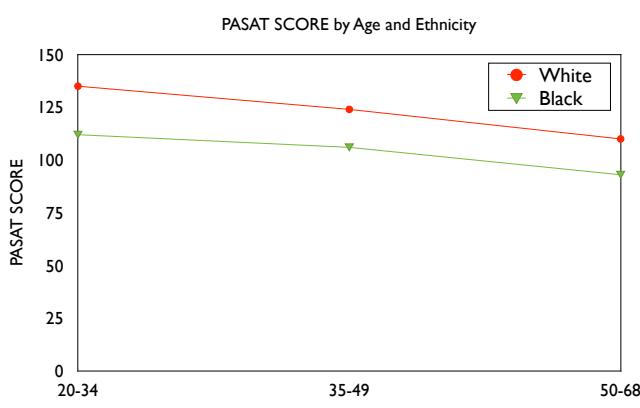
## Diehr et al (2003) Results

- Statistically and Clinically-significant differences in PASAT test result found for
  - Age
  - Education
  - Ethnicity
- Results not statistically significant:
  - Gender

1094

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## Diehr et al (2003) Results



1095

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## Current Events in Neuropsychology

- Sports Concussions
- Marijuana Legalization

1096

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# Careers in neuropsychology

- Clinical Neuropsychology - subfield of Clinical Psychology
- Ph.D. (or PsyD) with about 2000 hours clinical training
- Internship : 1 year (about 2000 hours)
- Post-doc : minimum 1 year (about 2000 hours clinical training)
- Employment -- usually in hospital or clinic, sometimes forensic (legal), often joint with Univ.
- Pay -- good, often better than typical clinical psychologist, not as good as MD.