

# Ch. 17: Neuropsychology

1851

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## Neuropsychology

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

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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

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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

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## Behavioral tests vs. biological

- Q: What has better reliability/validity to diagnose brain disease? brain imaging vs. neuropsychological tests?
- A: Often, most sensitive test of early dysfunction is a NP 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

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## Behavioral tests vs. biological 2

- Behaviors are mediated by multiple brain systems located throughout the brain.
- Not easily imaged with MRI
- Behavior is what matters. Testing behavior directly can be more accurate.
- Why not both? Imaging shows the damage, NP tests show the effects.

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## Assessment

- Psychological Test
  - administration
  - results
  - interpretation
- Test Battery
  - multiple tests
- Other sources of data
  - Clinical Interview
  - History
  - other records...

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## Neuropsych. Batteries

- 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

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## Fixed Batteries

- Halstead-Reitan
  - WAIS-IV 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)
  - Test battery improved and standardized at U. Nebraska
  - Approx 24 hours(!) to administer

1866

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## Halstead-Reitan Battery

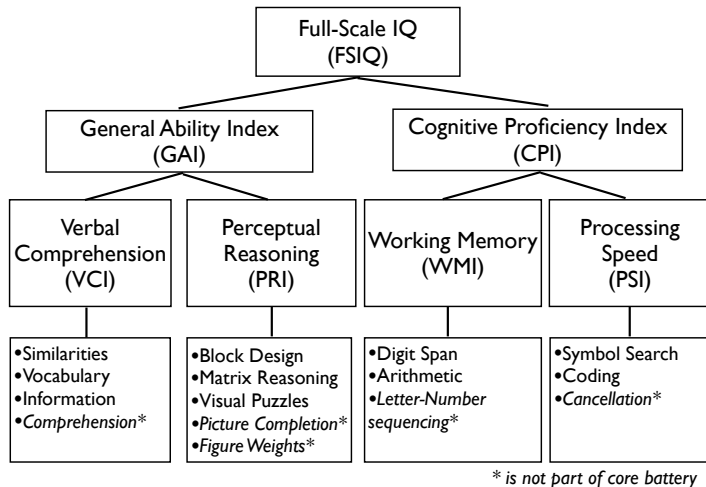
- Full WAIS IQ Test
- Additional tests:
  - Category test
  - Grooved pegboard
  - Rhythm
  - Speech comprehension
  - Finger tapping
  - Trail-Making Test
  - Grip Strength
  - Sensory-perceptual exam
  - ...

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# WAIS-4

1868



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## Trail Making Test (A & B)

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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

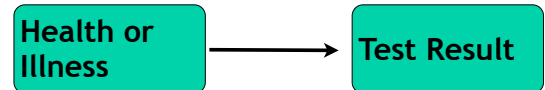
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## Demographic Corrections

1879

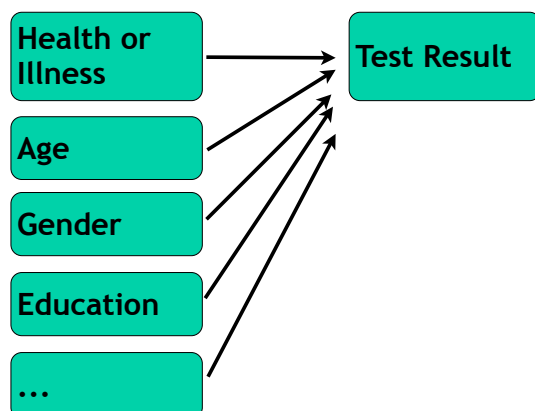
- Normative Data would be simple if there was one definition of "normal"
- Simple model



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## Demographic Model

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## Common Demographic Covariates

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

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## THE PACED AUDITORY SERIAL ADDITION TASK (PASAT): NORMS FOR AGE, EDUCATION, AND ETHNICITY

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## Diehr et al. (1998) Results

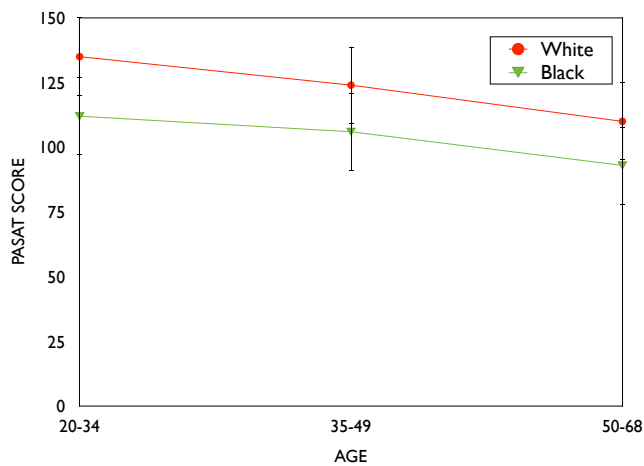
1888

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

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## PASAT by age & ethnicity

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## Age - after age 35...

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- Worsens significantly
  - fluid reasoning
  - speed of processing
  - working memory
  - long term memory
- Holds steady, or only small drop
  - Crystallized information
  - semantic memory
- May get better?
  - reasoning
  - vocabulary
  - emotion
  - metacognition

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## Sociocultural Topics in Neuropsychology

- Sports Concussions
- Marijuana Legalization