

Module 8: Neuropsychological Assessment of Cognition

Arnold Bakker

Department of Psychiatry and Behavioral Sciences
Division of Psychiatric Neuroimaging
Johns Hopkins University School of Medicine

Neuropsychological Assessment

Neuropsychology is an applied science concerned with the behavioral expression of brain function

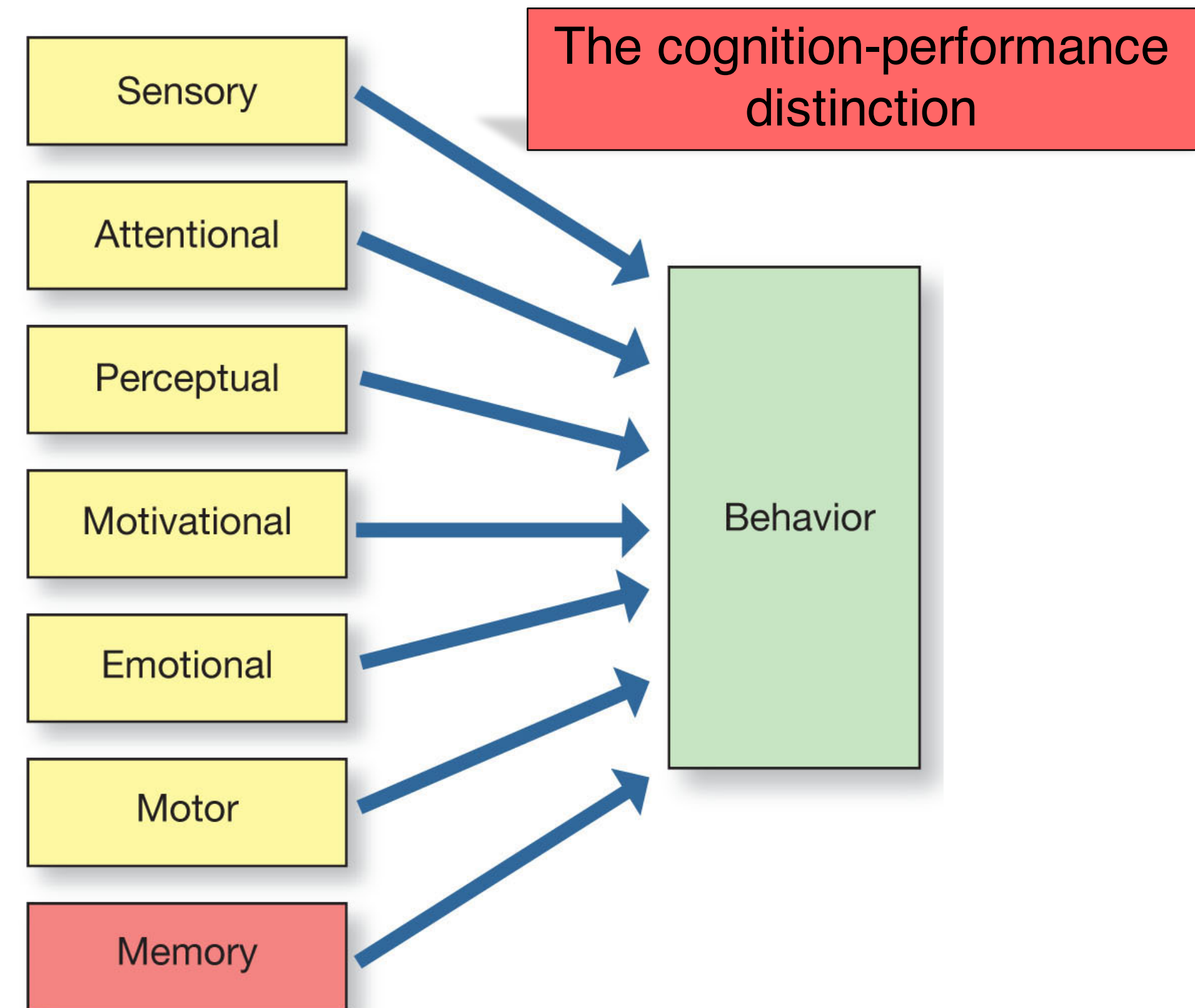
Purposes:

- Diagnosis
- Patient care and planning
- Rehabilitation and treatment planning
- Research

Neuropsychological Assessment

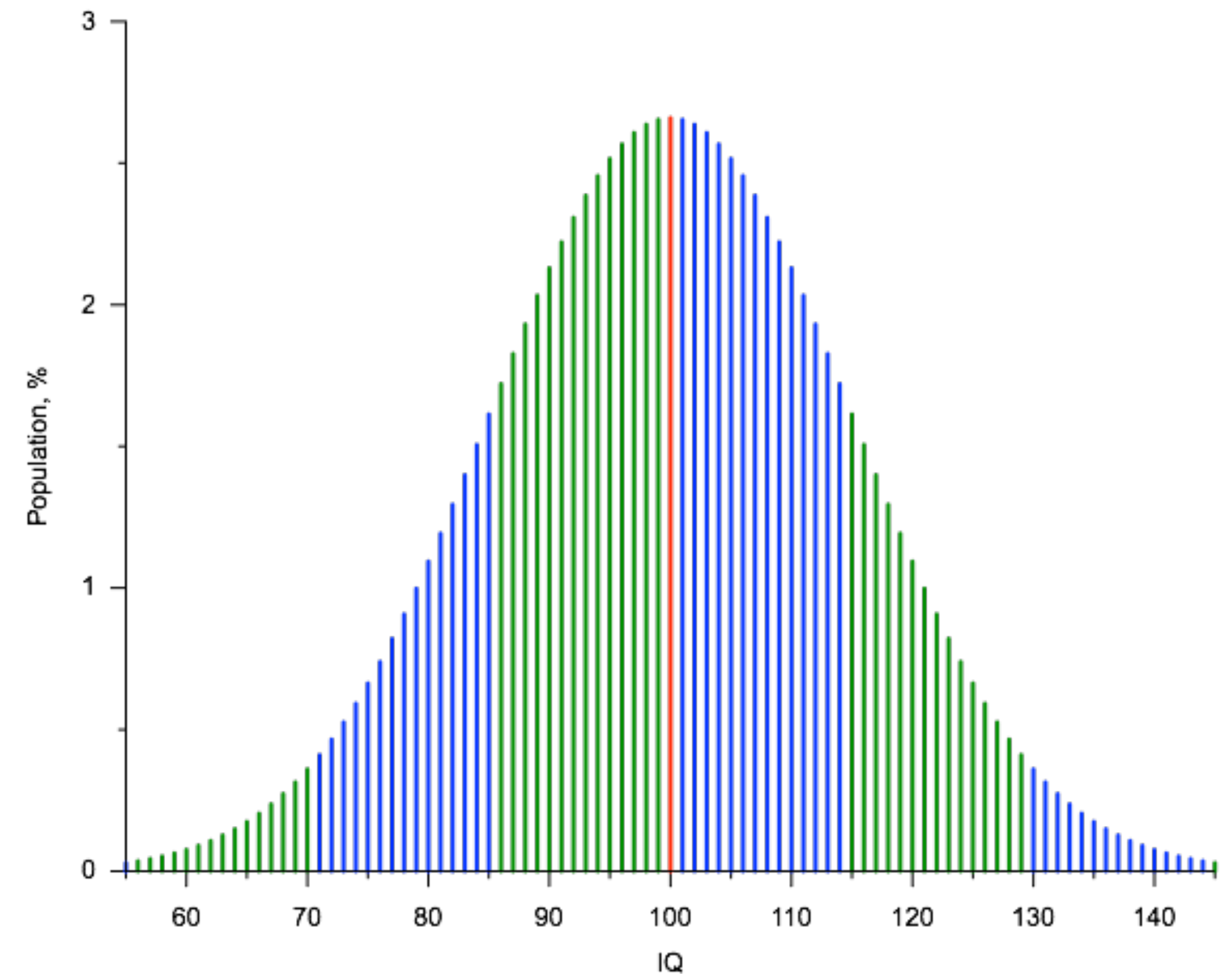
Key dimensions of behavior:

- Cognition
- Emotionality
- Executive functions



Neuropsychological Assessment

- Initially cognitive function thought to be a single function: Intelligence
- Single measure of intellectual ability defined as IQ
- Standardized tests decided in verbal and performance IQ

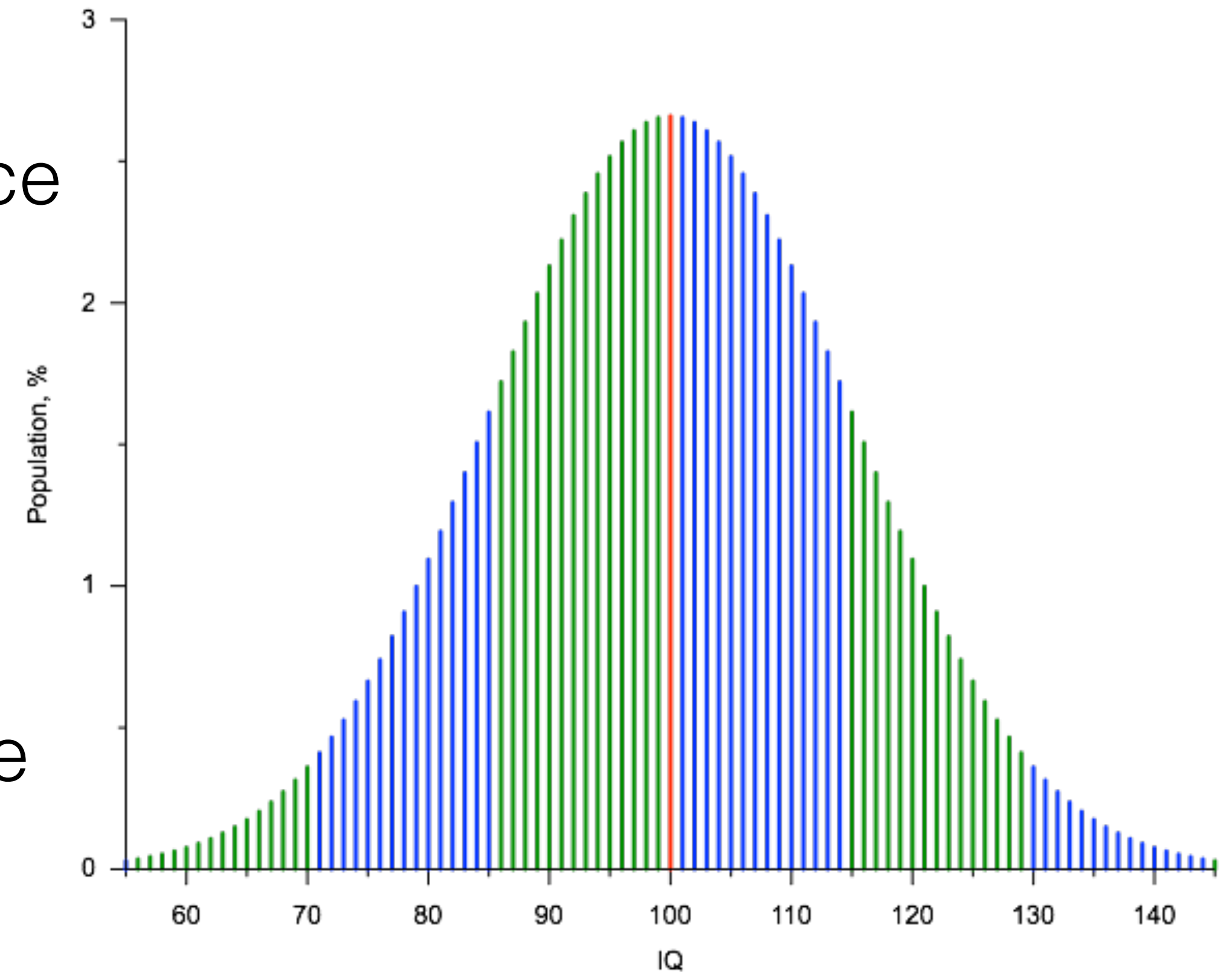


Neuropsychological Assessment

- IQ is a valid measure but not nearly specific enough to assess cognitive abilities
- Cognitive functions:
 - Receptive functions
 - Memory and learning
 - Thinking
 - Expressive functions
- Many types of assessments:
 - Intelligence tests
 - Tests of perception
 - Language tests
 - Memory tests
 - Visuospatial tests
 - Executive function tests
 - etc

Neuropsychological Assessment

- Assessment presupposes some ideal, normal or prior level of functioning against which the person's performance may be measured:
 - Population average
 - Individual comparison
- Requires strict conditions to equate the possibility of performance



Neuropsychological Assessment

Approaches to neuropsychological testing:

- Screening approach
- Hypothesis testing approach
- Battery approach

Neuropsychological Assessment

Screening approach:

- Determine if a person meets certain specific cognitive criteria
- Determine if a additional testing is required
- Flexible and efficient
- Numerous tests designed for this purpose including RBANS, MMSE, MOCA

Neuropsychological Assessment

Hypothesis testing approach:

- Assess a specific question / domain
- Detailed evaluation of one specific impairment or brain area
- Possibly overlook other domains or areas that could be affected and contribute

Neuropsychological Assessment

Neuropsychological battery approach:

- Comprehensive assessment of all important cognitive domains
- Detailed testing to create a complete profile
- Variety of tests to assess a domain
- Comprehensive but time consuming and taxing

Memory Assessment

Wechsler Memory Scale:

- Comprehensive battery to assess ability to learn and remember information
- Population norms are available
- Consists of 7 subtests:
 - Personal and Current Information
 - Orientation
 - Mental control
 - Logical memory
 - Digit span
 - Visual Reproduction
 - Verbal paired associates

Memory Assessment

Word List Learning:

- Many variants of list learning tasks
- Commonly used to assess ability to learn and remember new information and function of significant brain networks
- Provide measurements of learning, recall and recognition
- Assessment of impairments in encoding or retrieval of new information
- Often includes a delayed recall to assess longer term memory function

Executive Functioning Assessment

Executive functioning:

- Wide variety of tests designed to assess four major components
 - Volition
 - Planning
 - Purposive action
 - Effective performance
- Associated with functioning of the frontal lobes

Executive Functioning Assessment

Stroop Color Word Test:

RED	BLUE	GREEN	RED	BLUE
XXXX	XXXX	XXXX	XXXX	XXXX
RED	BLUE	GREEN	RED	BLUE

Executive Functioning Assessment

Tower of London Test:



Neuropsychological Assessment

- Many different specialized instruments available
- Test battery can provide a comprehensive assessment of cognitive, functional and emotional functions
- Relative measures against population or self
- Controlling administration and standardization is key