VIII. Wechsler Adult Intelligence Scale - Third Edition (WAIS-III; 1997)
A. Reading: Sattler Ch 12, 13; Gregory (1999) pp 77-85, 128-136

B. History of WAIS to WAIS-III
1. Wechsler's definition of intelligence; role of personality, psychopathology and aging on IQ

2. Wechsler-Bellevue (1939): Bellevue hospital pts

3. Wechsler Adult Intelligence Scale (WAIS; 1955):
   a. Eliminated Cube Analysis (show – is on Luria-Nebraska)
   b. Vocab became a regular subtest (was optional)
   c. Same factors and format, good reliability, validity

4. Wechsler Adult Intelligence Scale - Revised (WAIS-R; 1981):
   a. changes from WAIS:
      1) Order of subtests to alternating verbal and nonverbal
      2) Renormed
      3) Increased items
      4) Updated items and eliminated biased items
      5) Added time bonuses
      6) Flock of Birds: considered adding but not included because did not differentiate between different levels of IQs (supposed to be measure of visual scanning, processing speed)

   b. Reliability: excellent
      1) VIQ=FSIQ both > PIQ (split-half, test-retest)
      2) subtests: verbal > perf: Voc highest, OA lowest

   c. Validity: good; VIQ > FSIQ > PIQ

   d. Subtests: no new ones (same as on WISC-R and WPPSI although some not included)
      1) Verbal: Info, Comp, Arith, Sim, Digit Span, Vocab
      2) Performance: PC, PA, BD, OA, Digit Symbol (same as Coding B, different name)
      3) One difference: Comp included series of proverb interpretation items at end – therefore added verbal abstract thinking component and needed to look at these separately from common sense type items
      4) no optional subtests like WISC

   e. similar administration and testing limits (minor diffs in specifics)

   f. scoring:
      1) like WISC, WPPSI: subtest raw scores converted to scaled scores (mean=10, SD=3) which are used to calc VIQ, PIQ, FSIQ (mean=100, SD=15)
      2) However, scaled scores were not based on age - are compared to reference group of 20-34 yr olds: age adjustment was made when looking up IQs (diff tables acc age)
      3) Therefore, scaled scores could NOT be used for profile analysis
      4) Added a column on the face sheet labeled -- "Age Corrected scores" and looked up age-corrected scaled scores

   g. Interpretation
      1) Age corrected scaled scores were used for strengths and weaknesses, and calculation of factors (but NOT for calculation of IQs): important to know since WAIS-R used up until 1998, may have earlier testing want to compare to – most likely will be WAIS-R
2) Three Factors (not on face sheet – needed to look them up in Sattler, calculate on own
using age corrected scaled scores): Similar to WISC-R, no Processing Speed
   a) Verbal Comp: I, V, C, Sim
   b) Percept Org: BD, OA, PC (except 18-19 – PC not included in calculation)
   c) Freedm fr Distract: DSpan, Arith

   a. Three new subtests
      1) **Matrix Reasoning**: replaces OA (now optional): is an untimed performance test –
         like Raven’s progressive Matrices and Matrix Reasoning on the new WPPSI-III
      2) **Symbol Search** (like WISC-III): (optional - on Processing Speed factor, not IQs)
      3) **Letter-Number Sequencing**: new: measure of working memory; (optional - for
         Working Memory factor, not IQs): like Digit Span but includes letters and requires
         mental manipulation – rearrange the numbers and letters in order

   b. OA now optional; Digit Symbol now called **Digit Symbol-Coding** (more recognition)

   c. New norms: over 4500, 13 age groups, stratified sex, education, race/ethnicity, geog
      region
      (Although Okazaki & Sue, 2000 sugg not enough Asian Ams used in norms, validity studies)

   d. Increased age range: 16 up to 89 (74 on WAIS-R) due to increased lifespans (problem since
      WAIS widely used in neuropsych eval, often used for people who are older)

   e. Enlarged stimuli, de-emphasis on speed (because increased age range), added color on
      PC

   f. Item content updated, revised, elimination of US specific culture/history, biased items

   g. Increased ceiling all ages

   h. Easier manual (scoring for Voc, Comp, Sim in text, not in Appendix), materials sturdier (OA
      shield free-standing)(but don’t like new blocks!)

   i. **Age corrected scaled scores used to calculate IQs, factors** (like WISC, WPPSI): can
      interpret these directly for strengths and weaknesses; face sheet also has places to list subtests
      and record significant differences from the means, from other subtests, to facilitate profile
      analysis

   j. **Four Factors: VC, PO, Working Memory, Processing Speed**
      1) like WISC-III, Processing Speed emerged because of the addition of Sym Srch
      2) Working Mem: like Freedm fr Distract for children but w/ addition of Letter-Num Seq
      subtest has more of memory component
      3) 4 factors and subtests:
         a) Verbal Comp: V, S, I (no Comp)
         b) Percept Org: BD, PC, MR (instead of OA)
         c) Working Memory: DSpan, Arith, Letter-Num Seq
         d) Processing Speed: DSym (like Coding B), Sym Search
k. also, calculation of factors for WAIS-III in manual along with tables for significant differences) – all on test protocol

l. Lower scores than WAIS-R: PIQ 5 pts, VIQ 1 pt, FSIQ 3 pts (like other revisions when update norms)

m. Change in descriptor for 69 or below: "extremely low" instead of mentally deficient/defective

C. WAIS-III Subtests

1. Verbal
   a. **Info**: fund of knowledge, long term memory
      1) less affected by organicity, psychopathology: can use to estimate base line functioning
      2) requires language, auditory verbal processing and speech
      3) affected by environment, education, occupation for adults

   b. **Comp**: under social sits, judgment, common sense and verbal abstract thinking: proverbs
      1) proverb - need to look at separately from common sense items -- concrete, abstract, idiosyncratic (possible psychopathology)
      2) requires language, auditory verbal, speech
      3) common sense, like WISC, less emphasis on formal education

   c. **Arith**: numerical reasoning, basic arith, concentration/attention, mental manip of numbers
      1) requires language, auditory verbal, speech
      2) test limits: paper & pencil (look at kinds of errors made)
      3) very sensitive to organicity, psychopathology; good test for qualitative interpretation

   d. **Sim**: verbal abstract thinking, verbal concept formation
      1) requires language, auditory verbal, speech
      2) qualitative analysis: not just scores, but if errors are concrete, idiosyncratic
      3) sensitive to aging (often say are not alike or give differences); organicity, psychopathology

   e. **Digit Span**: conc/attention, immediate auditory verbal memory
      1) requires auditory verbal, sequencing, speech
      2) very sensitive to aging, organicity, psychopath
      3) good for qualitative observations

   f. **Voc**: knowledge word meaning; most reliable, high r w/ IQ
      1) requires language, auditory verbal, speech
      2) least affected by aging, organicity, psychopath - used to estimate premorbid level of functioning
      3) affected by education, environment, occupation

2. Performance (nonverbal)

   a. **PC**: perception essential visual details
      1) requires visual nonverbal, auditory verbal, speech and language component
      2) might see naming, word finding problems

   b. **PA**: understanding social sits, sequencing of socially relevant visual stimuli
      1) requires visual nonverbal, perception visual of details, auditory verbal (directions)
2) also, some language (since need to develop a story in your head – L hemisphere function)
3) a criticism of PA are findings that items are not in order of difficulty (Ryan & Lopez, 1999)

c. **BD**: nonverbal abstract thinking; visual analysis, synthesis, construction
   1) requires visual nonverbal, motor coordination, speed
   2) very sensitive to organicity: R lesion: lose details; L lesion: lose shape

d. **Digit Symbol-Coding** (like Coding B; added Coding to name to clarify, kept Digit Symbol because of familiarity, and to acknowledge similarity to a neuropsych test called Symbol Digit): visual motor speed and fine motor coordination; symbol association; incidental learning, motivation
   1) requires visual nonverbal, fine motor
   2) very sensitive organicity, aging, psychopathology
   3) good for qualitative obs, testing limits; have added an optional section on incidental learning

e. **Matrix Reasoning**: is an untimed performance test; reasoning, problem solving in novel situations, "fluid intelligence"; like the WPPSI-III subtest; like Raven’s Prog Matrices
   1) requires visual nonverbal, nonverbal abstract thinking (like BD but without motor component); used for PIQ and PO factor
   2) however, recent research sugg has a strong verbal component (Dugbartey et al., 1999: tested English speaking and immigrants - found strong correlation with verbal measures

f. **Sym Srch** (like WISC): nonverbal measure of processing speed (optional- on Processing Speed factor, not IQs) – give since needed for factors

g. **Letter-Number Sequencing**: like Digit Span but more demands to mentally manipulate stimuli than Digits Backwards; measure of working memory; (optional - for Working Memory factor, not IQs) – give since needed for factors; need rearrange letters and numbers in order when repeat

h. **OA**: optional because low reliability; visual analysis, synthesis, construction; more concrete
   1) requires visual nonverbal, motor coordination, speed, some language (helps if know object)
   2) careful w/ scoring certain items
   3) usually not administer unless a perf subtest is spoiled, can replace

D. **Scoring**
1. Subtests converted to scaled scores according to age -- used to calc VIQ, PIQ, FSIQ, factor indexes, and can be directly interpreted as strengths and weaknesses (like WISC-III)
2. Don’t include optional subtests for IQs but SS and LNS used for factors

E. **Interpretation**: like WISC-III
1. **First paragraph:**
   a. **FSIQ and level** (Table BC-2 back cover); optional: percentiles, confidence interval
   b. **VIQ and PIQ, levels of each** (Table BC-2 back cover), and if **significantly difference**
   c. **Validity**: always include a statement on validity and/or cautions in using results:
1) Ethnicity, non-representative norms, Eng 2nd language, physical challenged, temporary conditions: depression, sick, noisy
2) Permanent conditions not invalidate: organicity (brain damage), schizophrenia, mental retardation: reflect level of functioning

2. Second paragraph
   a. general overview statement (optional)

   b. Factors (optional) - if adds more than VIQ, PIQ info, or can use as the general overview
      1) if use, do NOT report factor scores; always report the levels of the factors
      2) can compare and report significant differences between factors

   c. Strengths and Weaknesses:
      1) Always give level of an "absolute" or relative strength/weakness
         a) 7 category classification: 16 up: very superior; 14-15: superior; 13: above or high av; 7: low or below av; 5-6: borderline; 4 down: far below average
         b) 5 category classification: 16 up: far above average; 13-15: above (or high) av; 5-7: below (or low) av; 4 down: far below average

      2) "Absolute" strengths/weaknesses - don't say "absolute"
         a) 13 up = strength, 16 up = exceptional strength
         b) 7 down = weakness, 4 down = exceptional weakness

      3) Relative strengths/weaknesses - always say relative and compared to what
         a) compared to mean verbal, perf, total (e.g., “average verbal”)
         b) compared to factor mean

      4) Comparisons between subtests: give levels of both, what difference means
         a) Must be statistically significant - already calculated for WAIS-III protocols: (generally 3-4 between subtests, subtest and means)
         b) Must be clinically significant: avoid multiple comparisons - false positives
         c) can say is significantly stronger/weaker; significantly more/less well developed; or a relative strength or weakness compared to...
         d) Always give levels (e.g., average, above average, superior, etc)

3. 3rd paragraph: Results of other tests (e.g., achievement, Bender)

4. Last paragraph: conceptualization:
   a) compare, contrast and integrate results across multiple tests
   b) pull together test results with background, behavior observations
   c) draw conclusions – what is going on with this person? why?
   d) bring up any hypotheses
   e) answer the referral question (if any)
   f) Don’t save your conceptualization for the summary!
   g) end with a concluding statement; often a summary – overall....
   h) can comment on psychopathology, emotional factors, personality – do not need to restrict the conceptualization to intelligence, achievement and visuomotor test results
F. WAIS-R/III and Psychopathology
1. number of disorders can affect test scores; discussed anxiety, depression before

2. Schizophrenia (and psychotic disorders)
   a. Reduced cognitive performance across tasks
   b. decline over time (can look similar to dementia)
   c. I, S, V generally preserved but reduced Arith, DSpan, DigSym-Cod - distractible, and because long term memory>short term
   d. qualitative: concrete or idiosyncratic, bizarre (esp verbal), under or overinclusive (Sim), personalized, self-referenced, overly elaborate (esp paranoid) or poverty of content (esp disorganized, chronic)
   e. unusual verbalizations, neologisms, cog decline - hard differentiate from organicity based on WAIS, neuropsych testing: case example 59 yo man
   f. IQ not accurate reflection of premorbid functioning or current functioning if actively psychotic and not treated; chronic schiz - considered valid assessment current functioning

3. Depression
   a. Low concentration/attention: scatter, A, Cod, Digit Sp, DigitSym-Cod, SymS
   b. Psychomotor slowing: beh obs, PIQ, timed
   c. Low motivation: gives up, decrease all areas, DigSym-Cod
   d. Fatigue, low energy
   e. Low self-esteem: negative cognitive set, self-fullfilling prophecy
   f. Qualitative analysis

G. WAIS-R and WAIS-III as a neuropsychological measure
1. Reading: Gregory: Ch 1 (2-13), Ch 2 (15-16, 21-28, 42-43), skim Ch 3

2. Purposes of Neuropsychological Assessment:
   a. Is it organic? (Is there brain damage, lesion, neurological disease process)
   b. Nature of organicity (type, localization)
   c. Resultant cognitive deficits: most important as better neurophysiological measures (CAT scans, PET scans) can provide more definitive information for a and b

3. Areas to Assess: intelligence, memory, language, visuospatial, motor, higher level concept formation (abstraction, reasoning, prob solving)

4. Two Approaches: each with advantages, disadvantages
a. **Battery**: standard test -- covers all areas including intelligence (Luria-Nebraska, Halstead-Reitan)

b. **Flexible Battery**: intell test + select tests for each domain

### H. Uses of the WAIS-R/III in Neuropsych assessment

1. **Source of hypotheses:**
   - a. overall IQ, VIQ and PIQ
   - b. subtests: cover all areas evaluated in neuropsych
     1) intelligence
     2) memory
     3) language
     4) visuospatial/construction
     5) motor
     6) higher level functions (abstraction, reasoning, cognitive flexibility, judgment)

2. **Comparison test**: serves as a baseline to compare other tests against

3. **Historical roots**
   - a. VIQ/PIQ: to determine organicity, laterality of lesion: results mixed
   - b. **deterioration quotient (DQ)**: ratio of hold to don't hold subtests
     1) "hold" subtests: Voc, Info, OA, PC
     2) "don't hold" subtests: D Span, Sim, D Sym, BD

   **formula:**
   
   \[
   \text{DQ} = \frac{(V+I+OA+PC)-(DSp+S+DSy+BD)}{(V+I+OA+PC)}
   \]

   4) DQ > .2 suggests deterioration
   5) too many false negatives; hit rate: 25-75%

4. **Current knowledge**
   - a. **General effects**
     1) Slowing
     2) Reduced frustration tolerance
     3) Fatigue
     4) Attempt to conceal deficits
     5) Overall reduced IQ

   - b. **Specific effects**
     1) Abstraction/reasoning deficits: Sim, Comp (proverbs), BD, Mat Reas
     2) Memory/concentration/attention deficits: DSp, A , Lett-Num Seq (WAIS-III) (V, I okay)
     3) Reduced speed: PA, BD, OA and especially D Sym-Coding (Sy Srch WAIS-III)
     4) Laterality of lesion:
     1) if VIQ < PIQ (15-17 pts or more): most likely L lesion
2) if PIQ < VIQ ( " " " " ): " " R "

3. Factors to consider
1) Education/occupation

   2) Age -- older: slower, more cautious, less cognitive flexibility, more errors, perseverate on inefficient strategies, more health problems

   3) Acute vs chronic lesion/insult

   4) Age of onset

5) Location
   a) laterality
   b) focal (circumscribed) vs. global (diffuse) (also relates to acute and chronic)

6) Agent/cause

7) Language dominant hemisphere

8) Premorbid adjustment, intelligence

9) Severity

5. WAIS-R/III Subtests:
   a. Info & Voc: least affected; look at quality of responses

   b. Comp & Sim: more sensitive verbal tests to L hem lesion, frontal lobe lesion

   c. Arith, Digit Span, Digit Symbol-Cod: very sensitive; diffuse and memory problems; DigSym-Cod - L or R damage causes problem

   d. PC: holds up well; can be affected posterior, esp R

   e. BD: very sensitive diffuse, posterior, esp R (but see w/ both - L lesion: loss of details, R: loss of gestalt)

   f. PA: sensitive frontal lobe dysfunction, also posterior, R

   g. OA: sw sensitive diffuse, slowing

   h. Letter-Num Seq: likely very sensitive like Digit Span and Arith

   i. Matr Reasoning: likely sensitive to frontal lobe, also posterior (visual processing)

   j. Sym Search: likely sensitive to diffuse effects, slowing, can be affected posterior, esp R

6. Comments
   a. No specific patterns
7. Major domains/areas of functioning and how WAIS-R/III contributes
   a. Intelligence:
      1) baseline - for comparisons other areas (generally FSIQ; can look at VIQ and PIQ)
      2) allows assessment of change/decline from premorbid levels (compare to estimate based on education, occupation) – generally FSIQ; can look at VIQ and PIQ depending background
      3) subtests: information about other cognitive areas
   b. Memory
      1) affected by dementia, head injury (frontal, temporal), strokes, chronic substance abuse
      2) types of memory tests
         a) material: verbal (words, #s) vs nonverbal
         b) modality: auditory vs visual
      c) 4 possible combinations:
         1) verbal auditory (remember words, numbers hear)
         2) verbal visual (remember words, numbers see)
         3) nonverbal auditory (remember tones, rhythms hear)
         4) nonverbal visual (remember pictures, symbols see)
      d) WAIS-R (and WAIS-III) confounds material w/ modality:
         1) D Span, Arith, Lett-Num Seq all auditory verbal (and Info for long term)
         2) to some degree, D Sym is visual verbal and nonverbal (has memory aspect)
      3) PC is visual nonverbal
      e) also look at duration
         1) immediate/attention/concentration: A, DSp
         2) short term: A, D Sym
      3) long term/remote: I, PC
         4) incidental learning: Dsym-Cod
   c. Language
      1) affected by dementia, strokes, head injuries
      2) all verbal tests and PC: naming, circumlocution
      3) receptive language (comprehension): all subtests
      4) expressive language: most verbal + PC
      5) WAIS does not include repetition
   d. Visuospatial/construction
      1) Also important, affected by dementia, stroke, head inj
2) perceptual component: PC, PA, BD, OA, D Sym-Cod (Sym Srch)

3) motor and coordination of two: BD, OA, DSy-Cod, PA

4) not include copying or larger visuospatial tasks

e. Motor
   1) gross and fine motor: most perf subtests (except PC)

   2) not include larger skilled movements

   3) confound with visuospatial: no motor tasks without vision

f. Higher level/Concept Formation/Executive/Frontal
   1) Sim, BD, Comp (proverbs), Mat Reasng: abstract thinking

   2) D Span (backwards), D Sym-Cod: cognitive flexibility - also Letter-Num Seq

   3) D Sp (backwards), Arith, Lett-Num Seq: mental manipulation of info

   4) Judgment: Comp, (PA)

   5) Reasoning: many - Sim, Comp, Arith, PA, BD, Matrix R