

The Ethical Practitioner: Assessing Executive Functions in an Emotional World

Yana Suchy, Ph.D., ABPP-CN
National Academy of Neuropsychology
Austin, TX, October 2015

University of Utah
Department of Psychology
U of U Brain Institute and Center on Aging

Financial Disclosure

I **have** financial relationships to disclose:

Employee of: N/A

Consultant for: N/A

Stockholder in: N/A

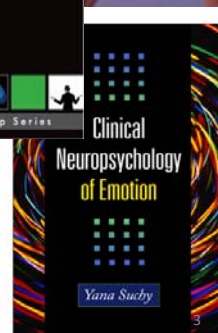
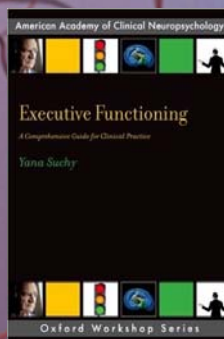
Research support from: N/A

Honoraria from: N/A

Royalties from: Oxford University Press
Guilford Press

Disclosures

- Executive Functioning: A Comprehensive Guide for Clinical Practice (To be released November 2015, Oxford)
- Clinical Neuropsychology of Emotion (2011, Guilford)



Learning Objectives and Preamble

- By the end of the workshop, participants will be able to
 1. Describe the APA ethical standards that are challenged by typical clinical methods of assessing executive functions (EF).
 2. List limitations in validity and reliability of typical EF measures.
 3. List ways in which emotional processes contribute to and detract from valid, reliable, and interpretable EF assessment.
 4. Describe ways in which clinical practice can be modified to improve adherence to APA ethical standards.

9.02 Use of Assessments

- (b) Psychologists use assessment instruments whose validity and reliability have been established for use with members of the population tested.

Construct Validity

- Valid for what?
 - Construct validity
- Defining the construct
 - “Those abilities that allow one to plan, organize, and successfully execute purposeful, goal-directed, and socially appropriate actions” (Lezak, over the course of decades).

EF: Defining the Construct

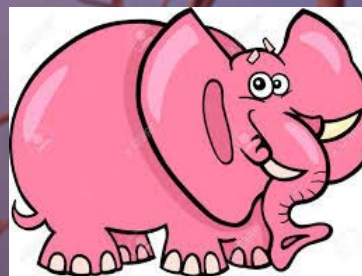
- “I know it when I see it” approach
 - EF deficit as a pathognomonic sign

- Pros

- Clinical NP do have an implicit sense of EF dysfunction

- Cons

- Cannot be tested
 - Precludes communication with non-NP professional



EF: Defining the Construct

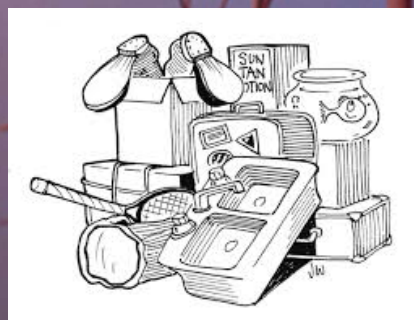
- “Everything-but-the-kitchen sink” approach
 - Planning, organization, problem solving, reasoning, inhibition, flexibility, initiation, response selection.....

- Pros

- Inclusive, comprehensive

- Cons

- A-theoretical, haphazard
 - Laundry list of terms that themselves need defining



Suchy, 2009, *Annals of Behavioral Medicine*

EF: Defining the Construct

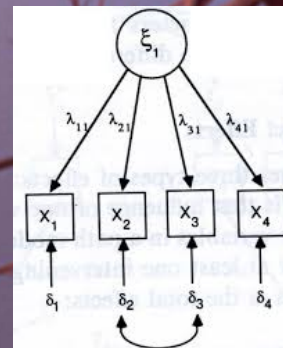
- Constructivist approach
 - E.g., Central Executive
- Pros
 - Theoretical, parsimonious, elegant
- Cons
 - Not comprehensive enough
 - Not clinically useful



It looks pretty, but isn't very practical

EF: Defining the Construct

- Factor-analytic approach
 - E.g., Miyake model (and many, many, many others...)
- Pros
 - Data driven
 - Psychometrically useful
- Cons
 - Too many...



Suchy, 2009, *Annals of Behavioral Medicine*, 37, 106-116

EF: Defining the Construct

- Factor-analytic approach (cont'd)

- Cons

- Highly population specific
 - Inherently test-dependent
 - Processes that are not assessed are omitted from the models
 - Tests included in analyses may or may not assess EF
 - Most EF tests have been validated based on neuroanatomy

REFERENCES:

Bondi et al. (2002) *Neuropsychology*, 16(3), 335-343

Delis et al. (2003) *JINS* 9(6), 936-946

Suchy (2009) *Annals of Behavioral Medicine*, 37, 106-116

Suchy (2015) *Executive Functioning*. Oxford University Press

EF: Defining the Construct

- Presumed tests of EF

- Trails
 - Stroop
 - Verbal fluency
 - Design fluency
 - Working memory
 - Category

Validates executive integrity

BUT WAIT, THERE IS MORE!

but also measure

- Attention/working memory
- Visual scanning
- Graphomotor speed
- Language
- Visual-spatial abilities
- Crystallized IQ
- Working memory

EF: Defining the Construct

- Matrix Reasoning
 - Rey Complex Figure
 - Tinker Toy
 - CVLT
 - Digit Symbol Coding
 - Symbol Search
 - Digit Span
 - Letter-number Sequencing
- Visual-spatial reasoning
Visual-constructional abilities
- Memory and learning
- Attention
Speed of processing
- Working memory

13

EF: Defining the Construct

- Factor-analytic approaches.
- The tail is wagging the dog



– EF is what EF tests measure

14

EF: Defining the Construct

- Neuroanatomic approach
 - EF is what the frontal lobes do
- Pros:
 - Functional domain of EF is ill-defined

“We have limited our research to patients with focal lesions of the frontal lobes....In our opinion this is the first step in limiting the terms of reference in the study of executive and frontal functions” (Stuss & Alexander, 2000, p. 291).

Stuss DT, Alexander MP. Executive functions and the frontal lobes: A conceptual view. *Psychological Research*. 2000; 63: 289–298.

EF: Defining the Construct

- Neuroanatomic approach
 - EF is what frontal lobes do
- Pros:
 - Functional domain of EF is ill-defined
- Cons
 - Not all frontal lobe functions are executive
 - Not all EF are frontal
 - Neuroanatomic definitions defy NP tradition
 - E.g., Memory vs. Temporal Lobe Functions

EF: Defining the Construct

- Evolutionary purpose
 - Vision to see with
 - Hearing to hear with
 - Somatosensory to feel with
 - Motor to move with
 - Memory to remember with
 - Language to speak with
 - Executive to....???



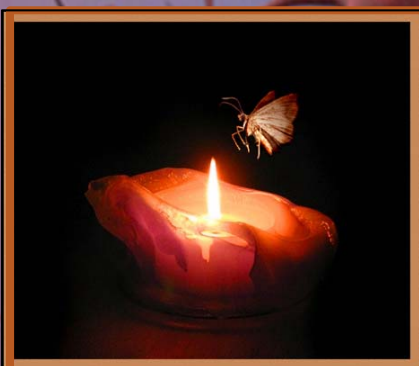
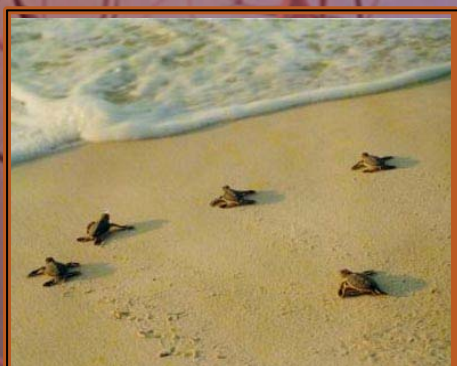
EF: Defining the Construct

- Functional domain = Evolutionary purpose
 - Executive is....to make it from point A to point B...



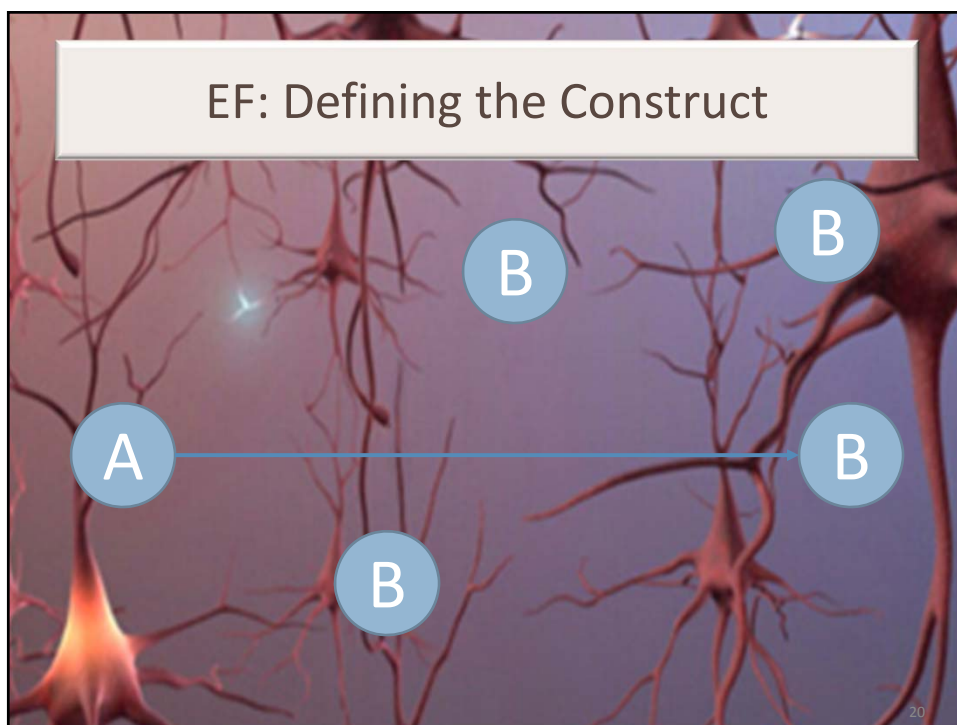
...but only if you have a choice in the matter!

EF: Defining the Construct



...but only if you have a choice in the matter!

EF: Defining the Construct



EF: Defining the Construct

- After all this work, are we any closer?
- Eliminated approaches
 - I know it when I see it
 - Everything but the kitchen sink
 - Constructivistic
 - Factor analytic
 - Neuroanatomic
- Accepted approach
 - Evolutionary purpose—Getting from A to B



“Those abilities that allow one to plan, organize, and successfully execute purposeful, goal-directed, and socially appropriate actions” (Lezak, over the course of decades).

21

EF: Defining the Construct

- So what good is it?
 - Conceptual framework
 - Constrains and focuses methodology for answering subsequent questions
 - What are “those abilities” (i.e., “sub-domains”)?




22


EF: Defining the Construct

- Decide
- Plan/Organize
- **Execute**

A



B






B

23

EF: Defining the Construct

- Decide
- Plan/Organize
- **Execute**
 - Initiate/Maintain
 - Select/Inhibit

24

EF: Defining the Construct

- Decide → Dysexecutive syndrome
- Plan/Organize → Dysexecutive syndrome
- Initiate/Maintain → Apathetic syndrome
- Select/Inhibit → Disinhibited syndrome

REFERENCES:

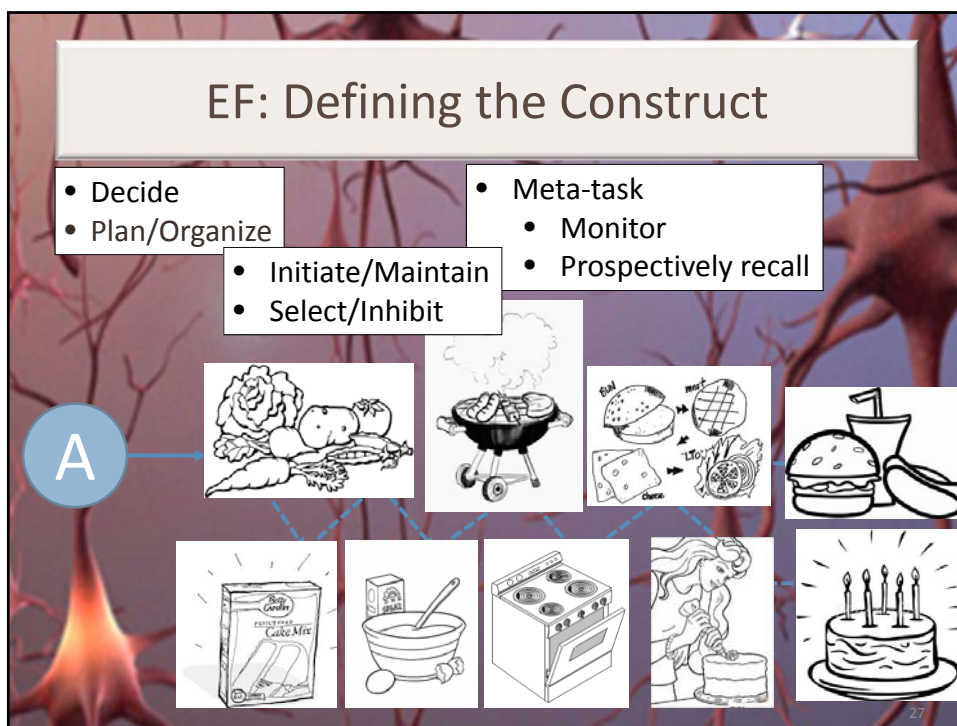
Duffy, J. D., Campbell, J. J., III, Salloway, S. P., & Malloy, P. F. (2001). Regional prefrontal syndromes: A theoretical and clinical overview *The frontal lobes and neuropsychiatric illness*. (pp. 113-123). Arlington, VA, US: American Psychiatric Publishing, Inc.

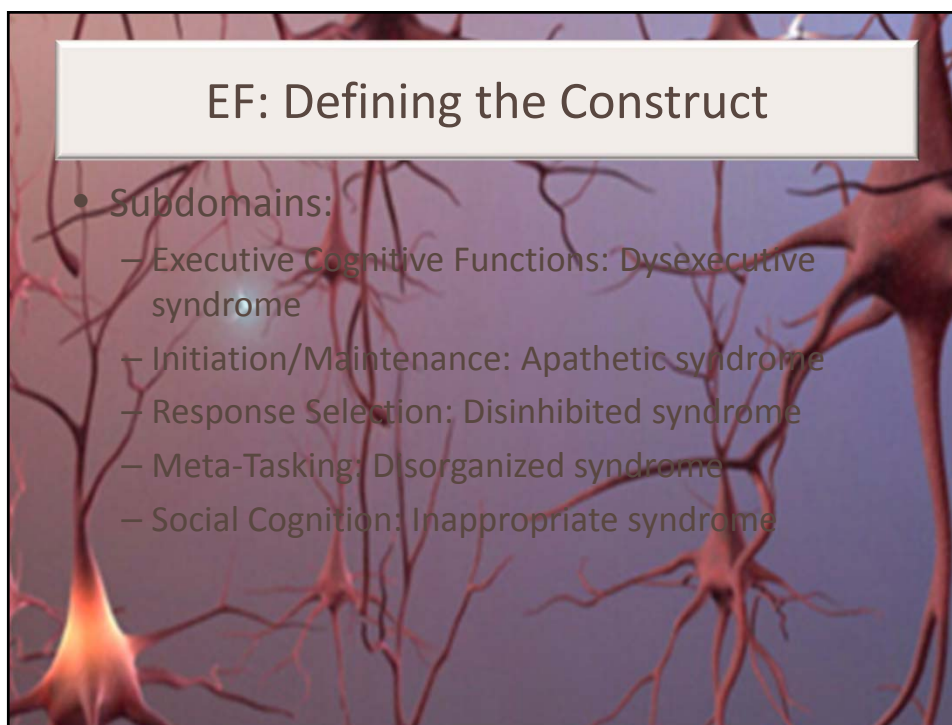
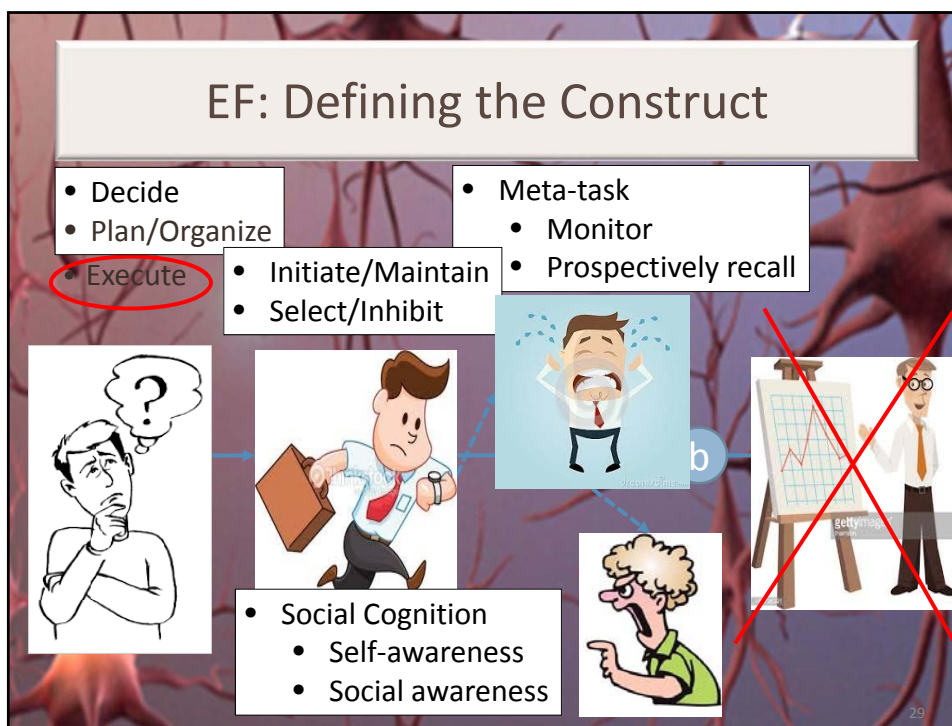
EF: Defining the Construct

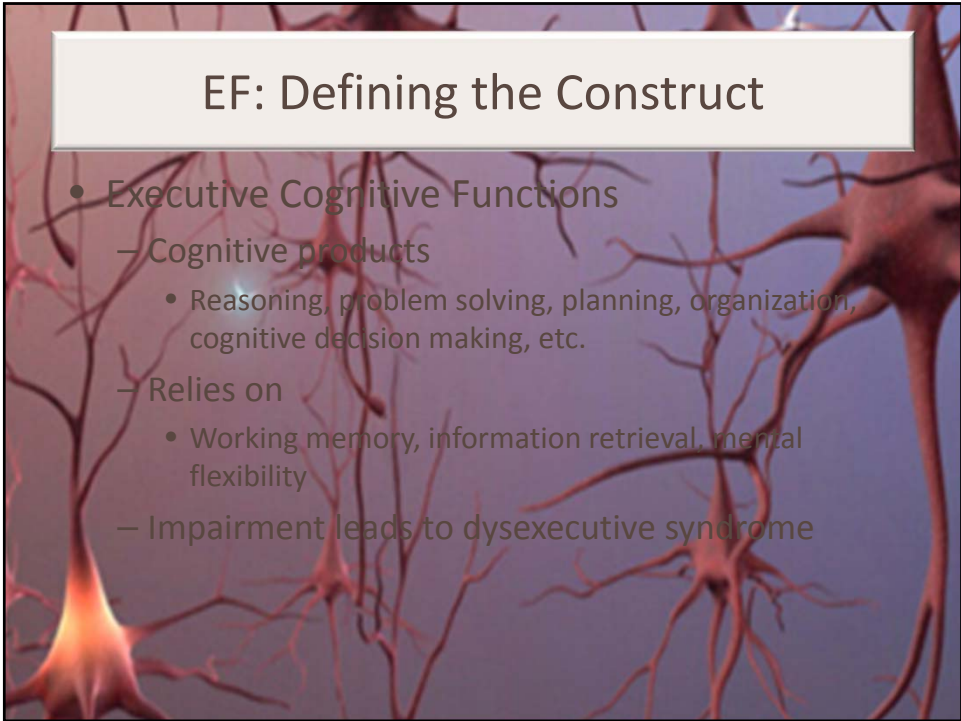
- Dysexecutive syndrome
- Apathetic syndrome
- Disinhibited syndrome
- Disorganized syndrome (“strategy application disorder”)

REFERENCES:

Shallice, T., & Burgess, P. W. (1991). Deficits in strategy application following frontal lobe damage in man. *Brain*, 114, 727-741.

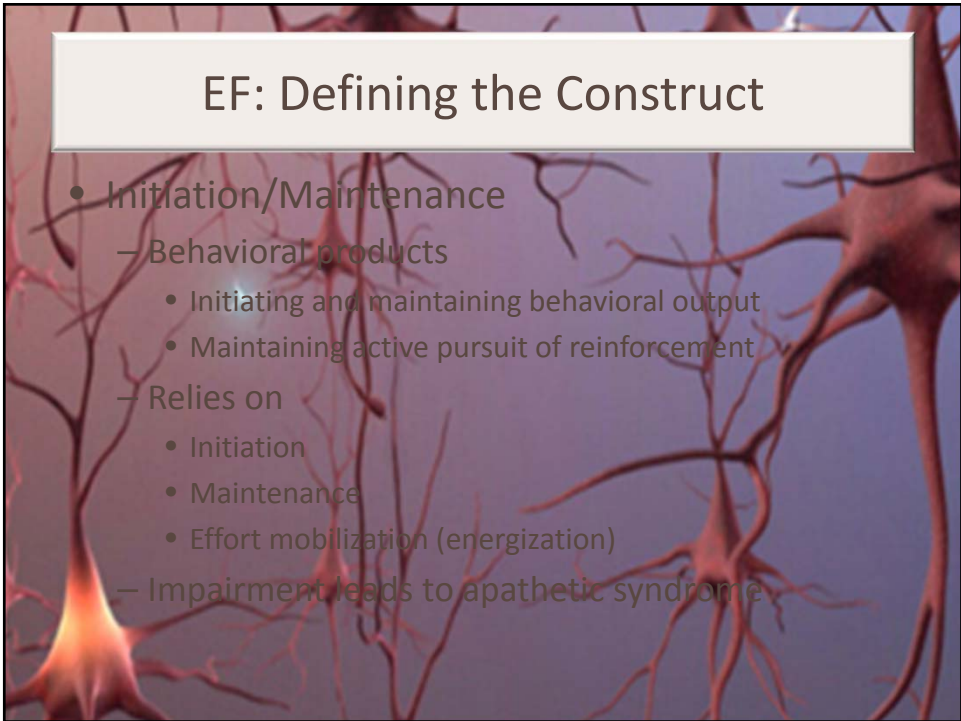




The background of the slide features a network of neurons with red and orange cell bodies and branching dendrites and axons against a dark blue background.

EF: Defining the Construct

- Executive Cognitive Functions
 - Cognitive products
 - Reasoning, problem solving, planning, organization, cognitive decision making, etc.
 - Relies on
 - Working memory, information retrieval, mental flexibility
 - Impairment leads to dysexecutive syndrome

The background of the slide features a network of neurons with red and orange cell bodies and branching dendrites and axons against a dark blue background.

EF: Defining the Construct

- Initiation/Maintenance
 - Behavioral products
 - Initiating and maintaining behavioral output
 - Maintaining active pursuit of reinforcement
 - Relies on
 - Initiation
 - Maintenance
 - Effort mobilization (energization)
 - Impairment leads to apathetic syndrome

The background of the slide features a network of neurons with red branching processes and glowing yellow-orange cell bodies, set against a dark blue background.

EF: Defining the Construct

- Response Selection
 - Behavioral products
 - Selecting when to proceed and when to stop ongoing behavior as needed
 - Stopping/inhibiting
 - Relies on
 - Threat sensitivity/error detection
 - Inhibition
 - Contingency updating
 - Impairment leads to
 - Disinhibited syndrome

The background of the slide features a network of neurons with red branching processes and glowing yellow-orange cell bodies, set against a dark blue background.

EF: Defining the Construct

- Meta-tasking
 - Behavioral products
 - Successfully interleaving multiple multi-step tasks over an extended period of time
 - Relies on
 - Prospective memory
 - Time-based and event-based
 - Meta-monitoring
 - Impairment leads to
 - Disorganized syndrome

The background of the slide features a network of neurons with reddish-brown cell bodies and branching dendrites and axons against a dark blue background. A semi-transparent white box with a thin black border is positioned in the upper left quadrant, containing the title.

EF: Defining the Construct

- Social Cognition
 - Behavioral products
 - Successfully alter behavior in response to social cues or social norms
 - Relies on
 - Self-awareness
 - Social awareness
 - Impairment leads to
 - Inappropriate syndrome

The background of the slide features a network of neurons with reddish-brown cell bodies and branching dendrites and axons against a dark blue background.

9.02 Use of Assessments

- (b) Psychologists use assessment instruments whose validity and reliability have been established for use with members of the population tested.

	Elemental EF Processes	Trails	Stroop	Verbal Fluency	Design Fluency	WCST	Halstead Category	Towers
ECF	WM	+	+	+	+	+	+	+
	Retrieval	N/A	N/A	+	+	Prior principles	Prior principles	Prior strategy
	Flexibility	+	+	+	+	+	+	+
I/M	Initiation	+	+	+	+	+	+	+
	Maintenance	+	+	+	+	+	+	+
	Effort mobilization	+	+	+	+	+	+	+
RS	Threat sensitivity	N/A	N/A	N/A	N/A	Register feedback	Register feedback	N/A
	Contingency Updating	N/A	N/A	N/A	N/A	Update principle	Update principle	N/A
	Error detection	+	+	+	+	+	+	+
	Inhibition	+	+	+	+	+	+	+

Construct Validity : Conclusions

- Typical neuropsychological tests used for assessment of EF tap into some, but not all, subdomains of the EF construct.
- No tests tap into any one subdomain uniquely.
- No one test taps into all EF processes.
- What can you do about it?

9.02 Use of Assessments

- (a) Psychologists administer, adapt, score, interpret or use assessment techniques, interviews, tests or instruments in a manner and for purposes that are appropriate in light of the research on or evidence of the usefulness and proper application of the techniques.

Validity: What can you do about it?

- Use multiple tests
- Avoid interpreting individual EF tests as measuring individual subdomains
- For subdomain differential, rely on
 - Qualitative aspects of performance (impulsivity, perseveration, impersistence, inappropriateness, etc.)
 - Collateral reports
 - Diagnosis (if known)

Validity: What can you do about it?

- Expand your battery of EF to include:
 - Social Cognition Test from ACS (WAIS-IV)
 - Use with caution existing tests
 - Six Elements Test and Zoo Map Test from the Behavioural Assessment of the Dysexecutive Syndrome (BADS) (B. Wilson, Alderman, Burgess, Emslie, & Evans, 1996)

Validity: What can you do about it?

- Be on the look-out for clinical versions of
 - Multitasking in the City Test (Jovanovski et al., 2012a, 2012b)
 - Day-out Task (Schmitter-Edgecombe et al., 2012)
 - Cooking Breakfast Task (Craig & Bialystok, 2006)

REFERENCES:

- Craig, F. I. M., & Bialystok, E. (2006). *Memory & Cognition*, 34(6), 1236-1249.
- Jovanovski, et al. (2012a) *Applied Neuropsychology: Adult*, 19(3), 171-182.
- Jovanovski, et al. (2012b) *Applied Neuropsychology: Adult*, 19(3), 207-220.
- Schmitter-Edgecombe et al. (2012) *Neuropsychology*, 26(5), 631-641.

9.02 Use of Assessments

- (b) Psychologists use assessment instruments whose validity and reliability have been established for use with members of the population tested.

Reliability

- Reliability
 - Performance on a test is repeatable
 - **BUT:** The EF construct itself is not stable
 - More vulnerable to situational factors than other neurocognitive constructs.
 - Trait vs state assessment?

Reliability

- Pain

- Affects EF uniquely (i.e., to the exclusion of other cognitive domains) (Karp et al., 2006; Scherder et al., 2008), or at least that more strongly than other cognitive abilities (Jongsma et al., 2011).
- Affects EF above and beyond depression, sleep disruption, and use of pain medications (Jongsma et al., 2011; Karp et al., 2006).

REFERENCES:

Jongsma, (2011). *PLoS ONE*, 6(8).
 Karp, (2006). *Pain Medicine*, 7(5), 444-452.
 Scherder, et al. (2008). *Gerontology*, 54(1), 50-58.

45

Reliability

- Sleep

- Affects EF uniquely (Bernier et al., 2013; Stavitsky et al., 2012)
- Sleep quality and efficiency (Benitez & Gunstad, 2012; Guoping et al., 2008; Plessow et al., 2011; Bernier, et al., 2013; Sutter et al., 2012).
- *Subjective* sleepiness may predict EF performance better than objective sleep quality/duration (Anderson et al., 2009).

REFERENCES:

Anderson et al. (2009). *Pediatrics*, 123(4), e701-e707.
 Bernier, et al. (2013). *Child Development*, 84(5), 1542-1553.
 Benitez, A., & Gunstad, J. (2012). *The Clinical Neuropsychologist*, 26(2), 214-223.
 Guoping et al. (2008). *Psychological Science (China)*, 31(1), 32-34.
 Plessow et al., (2011) *Journal of Sleep Research*, 20(2), 279-287.
 Stavitsky et al., (2012) *JINS*, 18(1), 108-117.
 Sutter et al., (2012). *Neuropsychology*, 26(6), 768-775.

46

Reliability

- Expressive Suppression
 - suppression of over affect
 - “stiff upper lip”



- Cognitive Reappraisal
 - Changing how you feel
 - “silver lining”

47

Reliability

- Expressive Suppression
 - Lapses in the Response Selection (RS) subdomain of EF
 - aggressive acts
 - disinhibited sexual behaviors
 - impulsive spending
 - breaking diets

REFERENCES:

- Baumeister & Alquist (2009). *Self and Identity*, 8(2-3), 115-130.
 Baumeister et al. (1998). *Journal of Personality and Social Psychology*, 74(5), 1252-1265.
 Gailliot & Baumeister (2007). *Personality and Social Psychology Bulletin*, 33(2), 173-186.
 Muraven et. Al (1998). *Journal of Personality and Social Psychology*, 74(3), 774-789.

48

Reliability

- Expressive Suppression (cont'd)
 - Lapses in Executive Cognitive Functions (ECF)
 - tendency to be persuaded by illogical arguments
 - logic errors
 - impaired cognitive decision-making
 - poor performance on typical measures of EF and working memory

REFERENCES:

Baumeister & Alquist (2009). *Self and Identity*, 8(2-3), 115-130.
 Pocheptsova et al. (2009). *Journal of Marketing Research*, 46(3), 344-355.
 Schmeichel et al. (2003). *Journal of Personality and Social Psychology*, 85(1), 33-46.
 Schmeichel et al. (2008). *Journal of Personality and Social Psychology*, 95(6), 1526-1540.
 Schmeichel, B. J., & Zell, A. (2007). *Journal of Personality*, 75(4), 743-755.

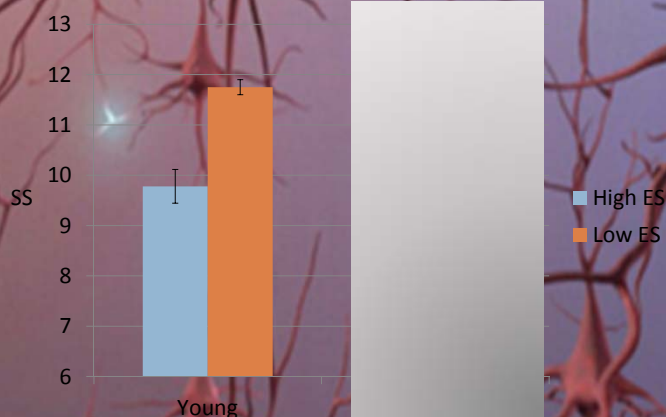
49

Reliability

- Expressive Suppression (cont'd)
 - Remaining questions:
 - Unique to EF?
 - Generalized to daily life?
 - Clinically meaningful?

50

Expressive Suppression: Naturally Occurring in Daily Life



REFERENCES:

Franchow & Suchy (2015), *Emotion*, 15(1), 78-89
Franchow & Suchy, in prep

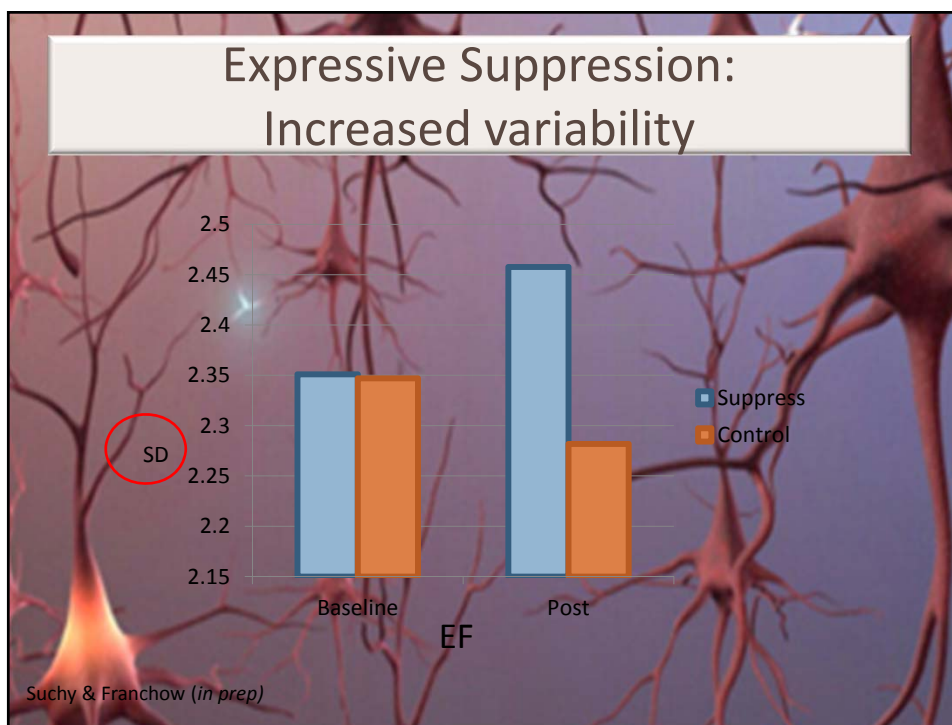
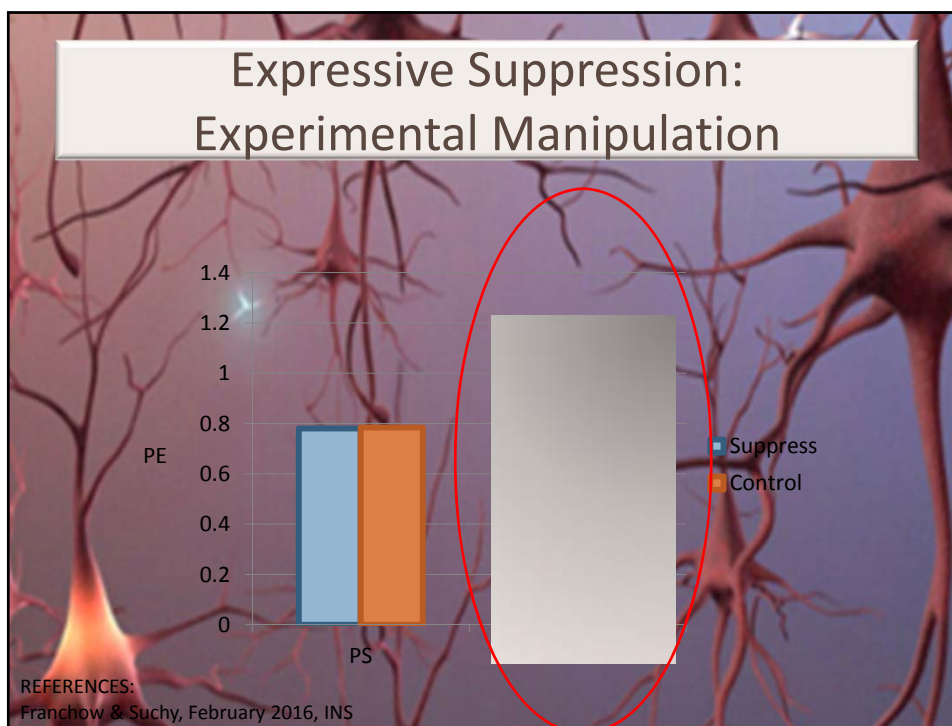
Expressive Suppression: Experimental Manipulation

- Participants
 - Age = 69 yrs, 66.3% female; education = 15.75 yrs
- Instruments: D-KEFS composites (EF and PS)
- Design



REFERENCES:

Franchow & Suchy, February 2016, INS



Reliability

- Expressive Suppression Conclusions:
 - Uniquely affects EF
 - Leads to more erratic performance across a battery of EF tests
 - Impact is clinically meaningful

55

Reliability

- Trait vs. state

Test-retest reliabilities

	1 Week	Same Day	Effect Size
Trails 4 (B)	.55	.71	.16
Letter Fluency	.67	.66	N/A
Category Fluency	.70	.88	.18
Stroop	.57	.76	.19

56

Reliability: Conclusions

- Reliability of current EF tests is confounded with the instability of the construct
- Reliabilities should be assessed on the same day
- Assessment only partly taps into the trait—on any given day, tests measure the “state of EF.”

Reliability: What can you do about it?

- Construct instability
 - Assess potential moderators carefully
 - Pain
 - Sleep
 - Expressive suppression
 - Be on the look-out for further validation of the BSRQ (Burden of State Emotion Regulation Questionnaire)

REFERENCES:

Franchow & Suchy, 2015, *Emotion*, 15(1), 78-89

Reliability: What can you do about it?

- Construct instability
 - Assess potential moderators carefully
 - Be on the look-out for further validation of the BSERQ
 - Create composite scores
 - 10 studies using EF composites
 - Age range 17 – 92 yrs
 - Sample size 45 to 236
 - 4 to 10 tests per composite

	Mean	Median
Individual tests	.607	.665
Composites	.775	.776

REFERENCES:

Suchy, 2015.
Executive Functioning. Oxford.

9.08 Obsolete Tests and Outdated Test Results

- (a) Psychologists do not base their assessment or intervention decisions or recommendations on data or test results that are outdated for the current purpose.

Outdated?

- Original Purpose
 - Detecting frontal lobe lesions
- Current Purpose
 - Diagnostics
 - Frontal lobe integrity matters
 - Functional outcome
 - Frontal lobe integrity does NOT matter
 - EF integrity DOES matter: Making it from A to B
 - Educational and occupational functioning
 - Independence, driving, etc.

61

9.08 Obsolete Tests and Outdated Test Results

- (a) Psychologists do not base their assessment or intervention decisions or recommendations on data or test results that are outdated for the current purpose.
- (b) Psychologists do not base such decisions or recommendations on tests and measures that are obsolete **and** not useful for the current purpose.

Useful for current purpose?

- **Gene Kranz (*Apollo 13*):** “I don't care about what anything was DESIGNED to do, I care about what it CAN do.”



Ecological Validity

- Verisimilitude
 - Does a test measure actual abilities needed for daily functioning (e.g., actual placement of pills in a pillbox, actual driving, etc.)
 - Closely related to face validity
 - NP tests are typically low
- **Is this a problem?**

Ecological Validity: Verisimilitude

- NP tests are similar to blood test
 - Covert markers of illness
 - NOT necessarily related to how you feel
- Potentially more sensitive than tests with high face validity
 - Can detect sub/pre-clinical problems
 - Face-valid tests by definition do not detect a problem until it is actually evident in daily life



Ecological Validity

- Verisimilitude
 - Does a test measure actual abilities needed for daily functioning (e.g., actual placement of pills in a pillbox)
 - Closely related to face validity
 - NP tests are typically low
- Veridicality
 - Does the test predict indices of outcome
 - Closely related to criterion validity
 - NP tests are typically low.... aren't they?

Ecological Validity: Veridicality

- Research (group level data):
 - “EF” tests among the best predictors of functional independence (IADLs)
 - Outperform other cognitive measures
 - Successful on a group level
 - Error cancels out

REFERENCES:

Boyle et al., (2002). *International Journal of Geriatric Psychiatry* 17(2), 164-169
 Jefferson et al. (2006). *International Journal of Geriatric Psychiatry*, 21(8), 752-754
 Koehler et al (2011). *Dementia and Geriatric Cognitive Disorders*, 31(1), 81-88
 Kraybill & Suchy (2011). *TCN*. 25 (2), 210-223
 Kraybill et al., (2013). *TCN*. 27 (2), 238-55
 Niewoehner et al., 2012 *Journal of the American Geriatrics Society*, 60(11), 2070-2074.
 Perna et al. (2012). *Applied Neuropsychology: Adult*, 19(4), 263-271

67

Ecological Validity: Veridicality

- Clinical Practice (individual level):
 - Notoriously poor
 - Why?



68

Causes of Poor Ecological Validity

- Not all EF sub-domains are assessed
- Norms don't consider outcomes
- Structured testing environment
- Lapses are erratic, EF fluctuates
- Other person- and context-specific factors

69

Not all EF sub-domains are assessed

- What do EF tests measure?
 - Trails
 - Stroop
 - Verbal fluency
 - Design fluency
 - WCST
 - Towers
- Executive Cognitive Functions
 - Initiation/Maintenance
 - Response Selection
 - Meta-tasking
 - Social Cognition

70

Causes of Poor Ecological Validity

- Not all EF sub-domains are assessed
- Norms don't consider outcomes
- Structured testing environment
- Lapses are erratic, EF fluctuates
- Other person- and context-specific factors

71

Ecological Validity: Norms

- Current norms are diagnostic
 - Demographic correction
 - Designed to detect decline from normative baseline
 - Don't quantify outcomes



Normative approaches
(not tests) outdated for
current purpose

72

Ecological Validity: Norms (cont'd)

- Criterion-based norms
 - Directly link test performance to outcomes
 - Tables of minimum test performance needed for error-free performance of a given daily task

73

Causes of Poor Ecological Validity

- Not all EF sub-domains are assessed
- Norms don't consider outcomes
- **Structured testing environment**
- Lapses are erratic, EF fluctuates
- Other person- and context-specific factors

74

Ecological Validity: Structured Environment

- Clinical psychology testing traditions
 - Measure ideal performance under ideal circumstances
 - Human potential **for success**



Ecological Validity: Structured Environment (cont'd)

- Clinical NP assessment
 - Potential for success
 - Potential for **failure**
 - The least ideal circumstances
- Neuropsychology stress test
 - Induce lapses in performance



Causes of Poor Ecological Validity

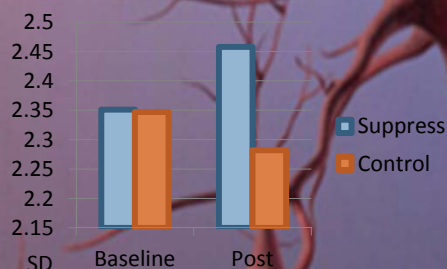
- Not all EF sub-domains are assessed
- Norms don't consider outcomes
- Structured testing environment
- **Lapses are erratic, EF fluctuates**
- Other person- and context-specific factors

77

Ecological Validity: EF Fluctuations

- Variability in performance is a sign of EF weakness
 - Across sessions
 - Within sessions
 - Across tests
 - Within tests

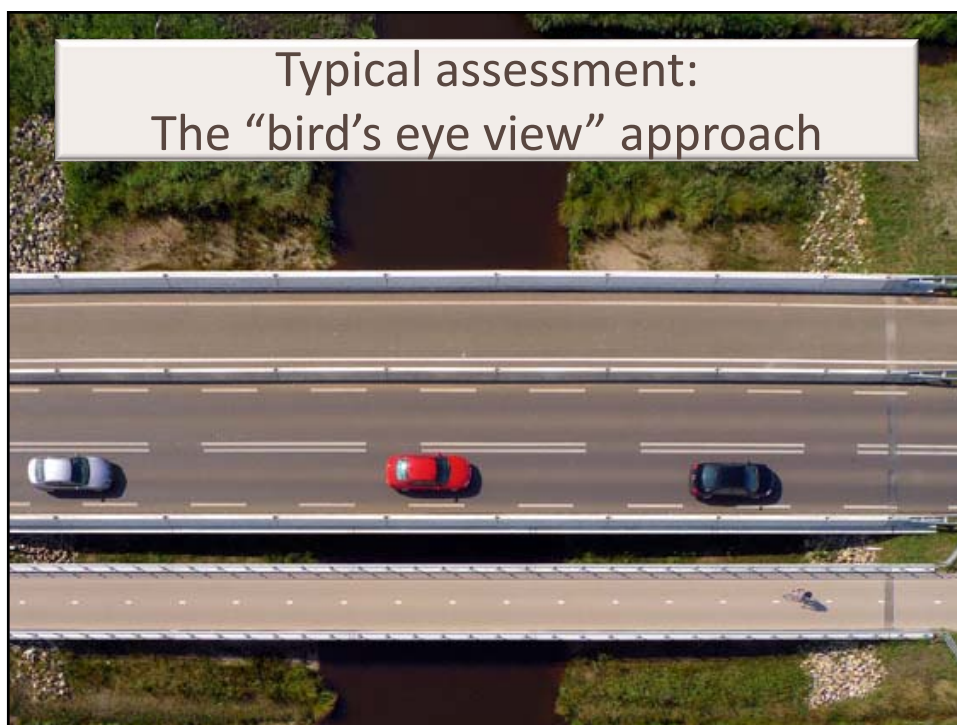
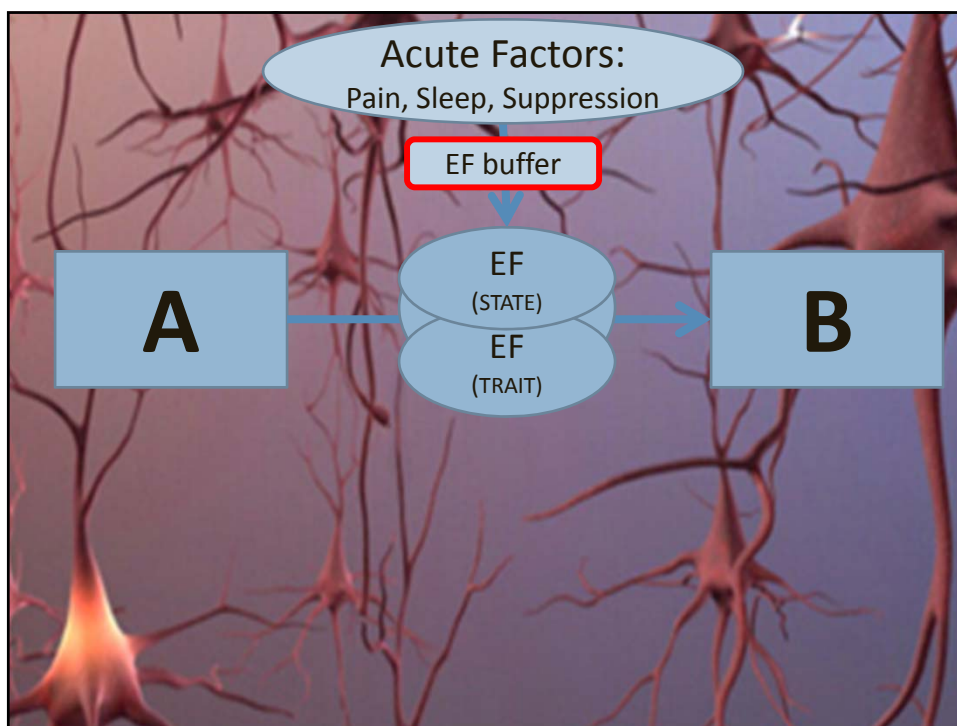
- **Can we do more?**



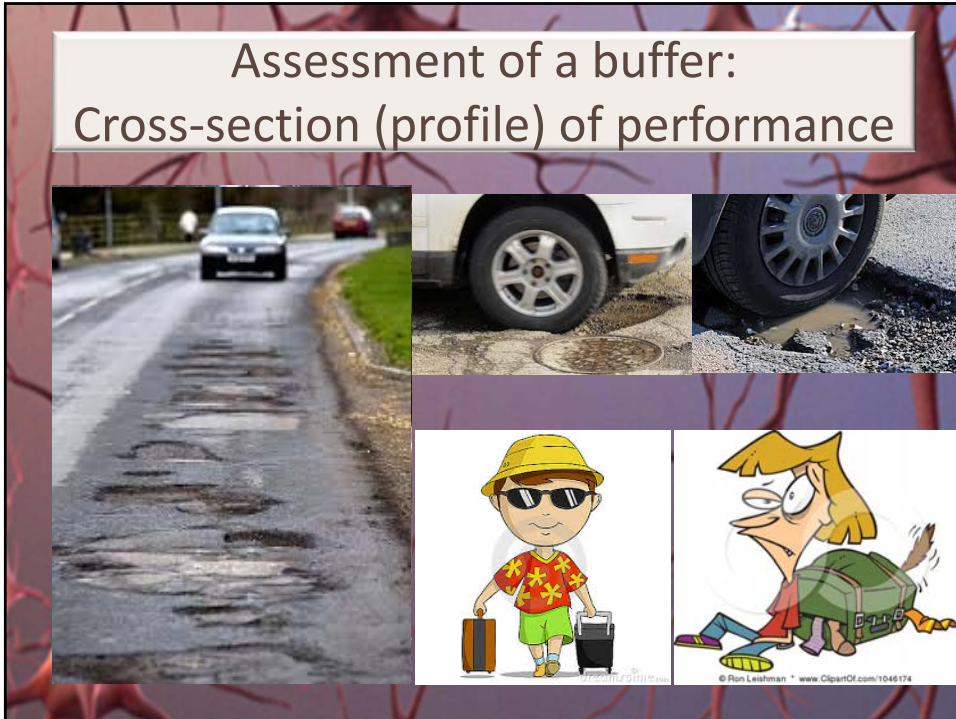
REFERENCES:

Burton, Strauss, Hultsch, & Hunter, 2006, JCEN, 28(1), Jan, 2006 pp. 67-83.
 Hultsch et al. (2000). Neuropsychology, 14(4), 588-598. ; MacDonald, Li, &
 Bäckman (2009). Acta Psychologica Sinica, 41(11) 1040-1048.

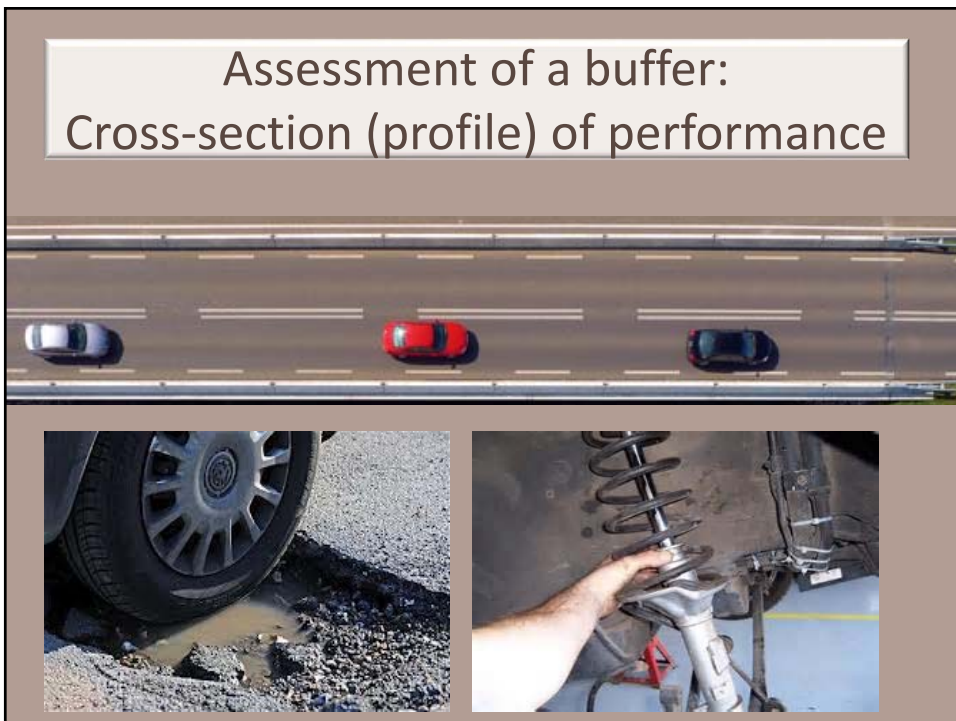
78



Assessment of a buffer:
Cross-section (profile) of performance



Assessment of a buffer:
Cross-section (profile) of performance



Push-Turn-Tap (PTT) task

- Electronic Analogue to Luria “Fist-Edge-Palm task”
- Measure of EF (Suchy et al, 2005; Suchy & Kraybill, 2007; Kraybill & Suchy, 2009; Suchy et al., 2010; Kraybill & Suchy, 2011; Kraybill, Thorgusen, & Suchy, 2013)
 - Correlates with meaningful outcomes (IADLs) (Kraybill & Suchy, 2011; Kraybill, Thorgusen, & Suchy, 2013)
 - Correlates with other presumed tests of EF (Kraybill & Suchy, 2008; Suchy & Kraybill, 2007; Suchy, Kraybill, & Larson, 2010)
 - Correlates with BG-frontal connectivity (Marchand et al., 2012; 2013; Suchy, Lee, & Marchand, 2013)
- Ecological validity & Cost effectiveness (Kraybill & Suchy, 2011; Kraybill, Thorgusen, & Suchy, 2013)

Push-Turn-Tap (PTT) task: References

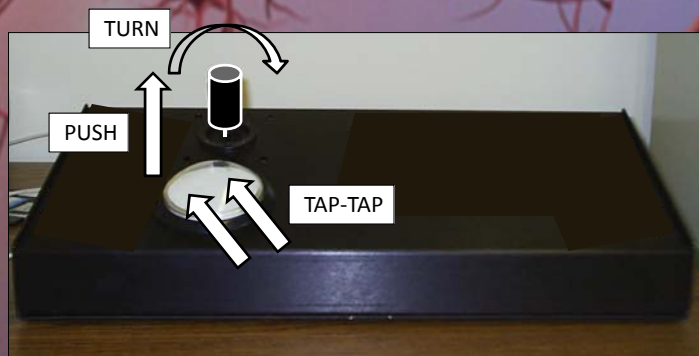
- Euler, M., Niermeyer, M., & Suchy, Y. (2015). Neurocognitive and neurophysiological correlates of motor planning during familiar and novel contexts. *Neuropsychology*. doi.org/10.1037/neu0000219
- Kraybill, M., & Suchy, Y. (2011). Executive functioning, motor programming, and functional independence: Accounting for variance, people, and time. *The Clinical Neuropsychologist*, 25 (2), 210-223.
- Kraybill, M. & Suchy, Y. (2008). Evaluating the role of motor regulation in non-verbal fluency: Partialling variance in the Ruff Figural Fluency Test. *Journal of Clinical and Experimental Neuropsychology*, 30 (8), 903-912.
- Kraybill, M., Thorgusen, S.R., & Suchy, Y. (2013). The Push-Turn-Tap task outperforms measures of executive functioning in predicting declines in functionality: Evidence-based approach to *TCN*, 27 (2), 238-55.
- Larson, J.G., & Suchy, Y. (2014). Does language guide behavior in children with autism? *Journal of Autism and Developmental Disorders*, 44(9), 2147-2161.
- Larson, J.G., & Suchy, Y. (2015). The contribution of verbalization to action. *Psychological Research*, 79(4), 590-608.
- Marchand, W.R., Lee, J.N., Suchy, Y., Garn, C., Johnson, S. Wood, N. & Chelune, G. (2011). Age-related changes of the functional architecture.... *Neuroimage*, 55, 194-203.

Push-Turn-Taptap (PTT) task: References (cont'd)

- Marchand, W.R., Lee, J.N., Suchy, Y., Garn, C., Chelune, G., Johnson, S. Wood., N. (2013). Functional architecture of the cortico-basal ganglia circuitry during motor task ..*Human Brain Mapping*, 34, 1194-1207.
- Suchy, Y., Lee, J.N., Marchand, W.R. (2013). Aberrant cortico-subcortical functional connectivity among women with poor motor control: Toward uncovering the substrate of hyperkinetic perseveration. *Neuropsychologia*, 51 (11), 2130-2141.
- Suchy, Y., Kraybill, M., Franchow, E. (2011). Practice effects and beyond: Reaction to novelty as an independent predictor of cognitive decline... *Journal of the International Neuropsychological Society*, 17, 101-111.
- Suchy, Y., Kraybill, M., Larson, J.G. (2010). Understanding Design Fluency: Motor and executive contributions. *Journal of the International Neuropsychological Society*, 16, 26-37.
- Suchy, Y., & Kraybill, M. (2007). The relationship between motor programming and executive abilities: Constructs measured by the Push-Turn-Taptap task from the BDS-EV. *JCEN*, 29 (6), 648-659.
- Suchy, Y., Eastvold, A., Whittaker, W.J., & Strassberg, D. (2007). Validation of the Behavioral Dyscontrol Scale-Electronic Version: Sensitivity to subtle sequelae of mild traumatic brain injury. *Brain Injury*, 21, 69-80.
- Suchy, Y., Derbidge, C., & Cope, C. (2005). Behavioral Dyscontrol Scale-Electronic Version: First examination of reliability, validity, and incremental utility. *The Clinical Neuropsychologist*, 19, 4-26.

Push-Turn-Taptap (PTT) task

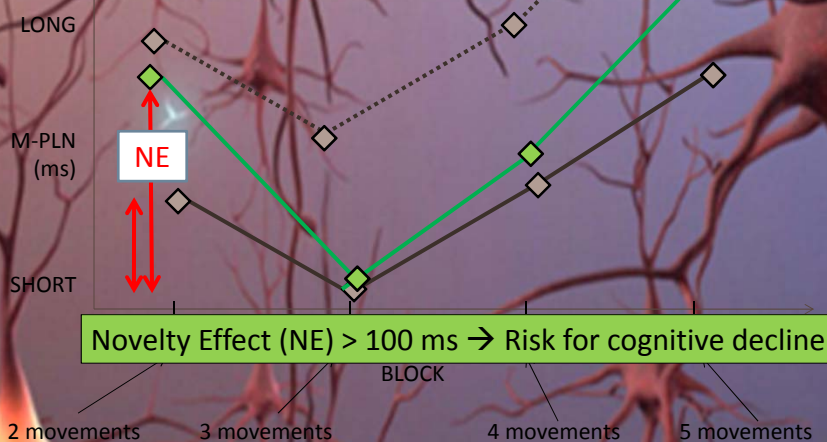
- Electronic Analogue to Luxia “Fist-Edge-Palm task”



Push-Turn-Tap (PTT) task

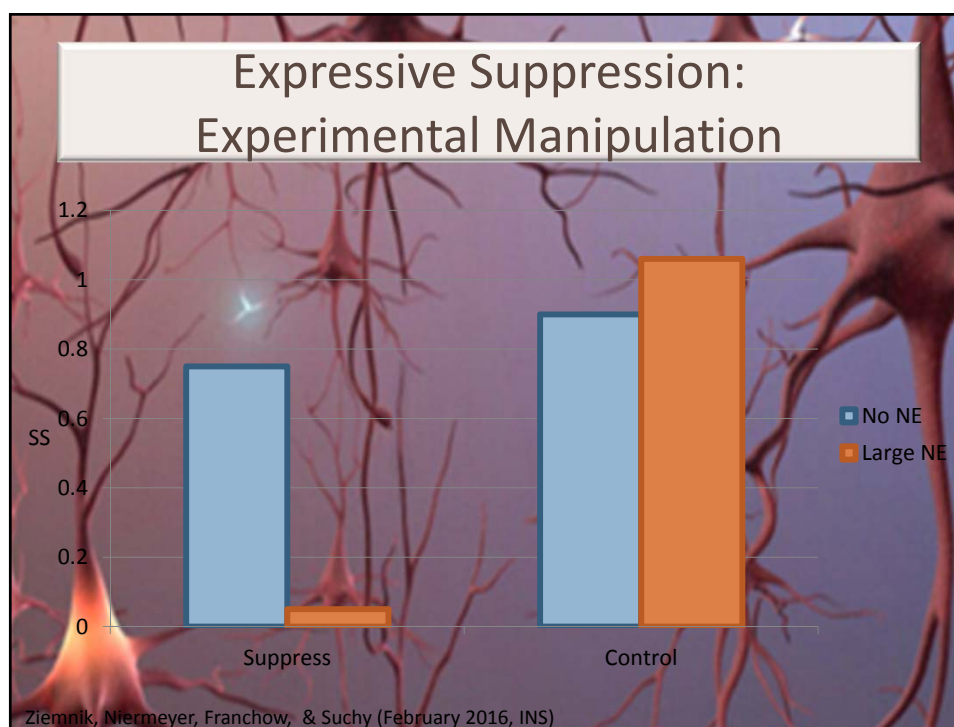
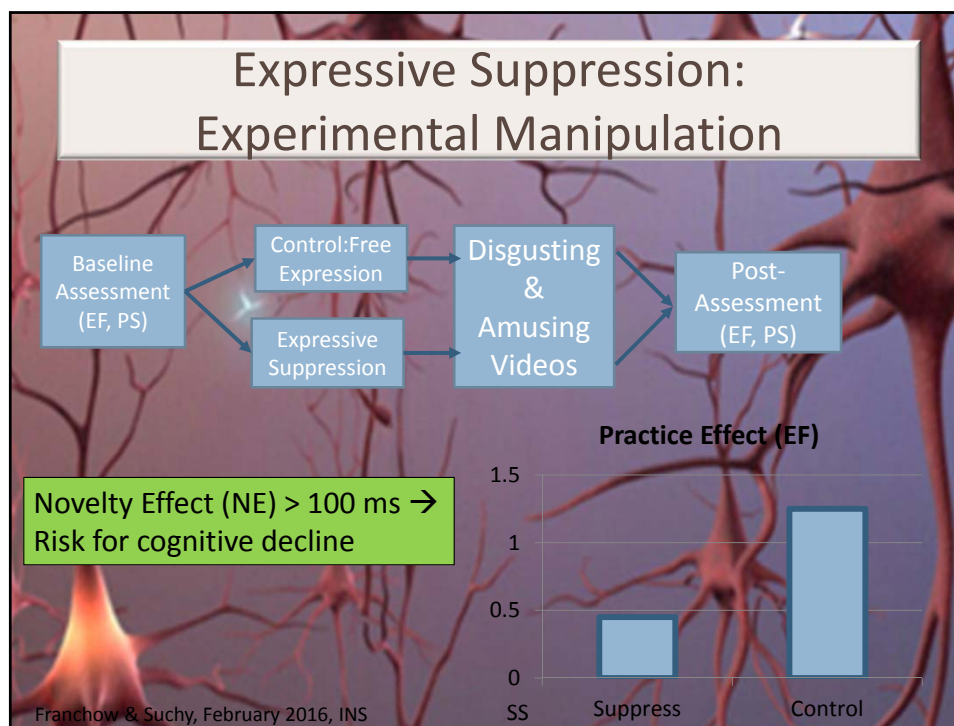
- Discrete processes
 - Motor (Action) Planning
 - Speed
 - Learning/Accuracy
 - Smoothness
 - Hyperkinetic perseveration
- Intra-individual fluctuations
 - Changes across four blocks
 - Effects of novelty and complexity

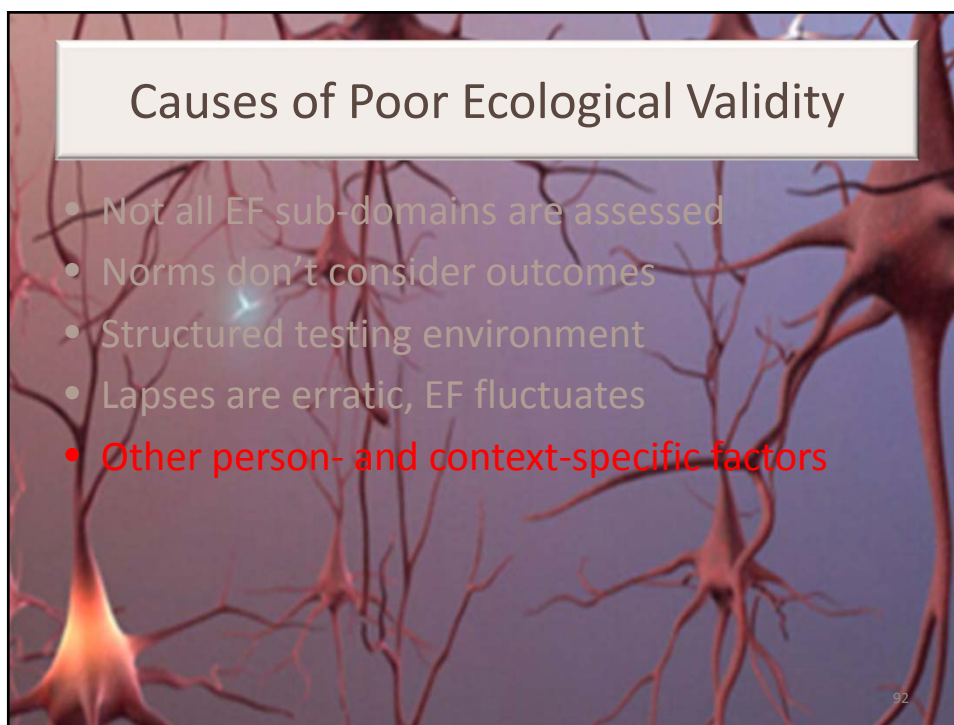
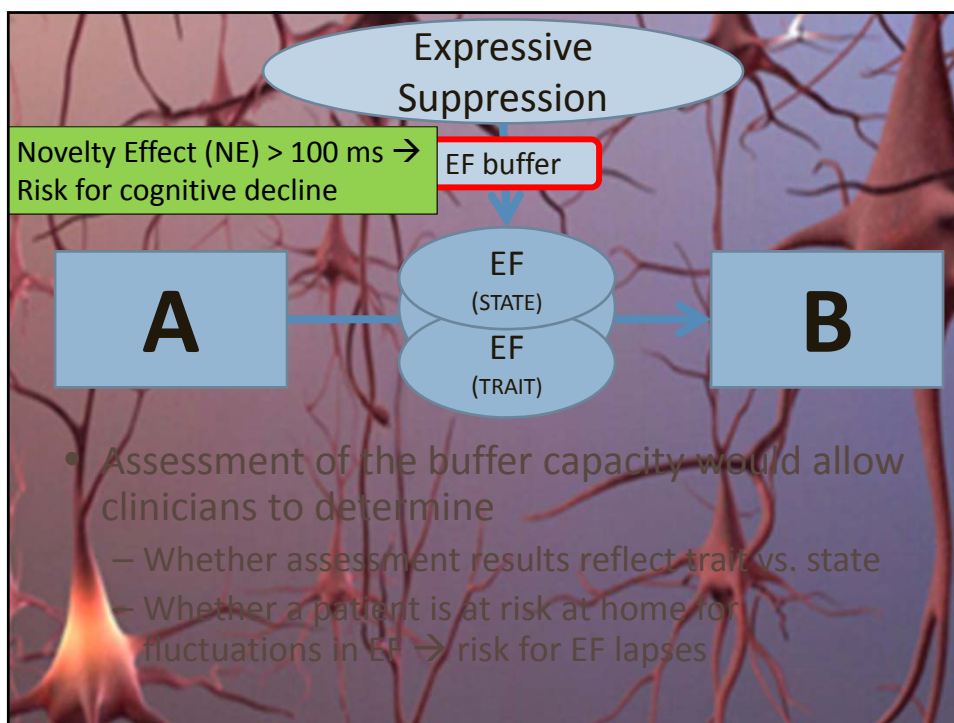
Push-Turn-Tap (PTT) task



REFERENCES:

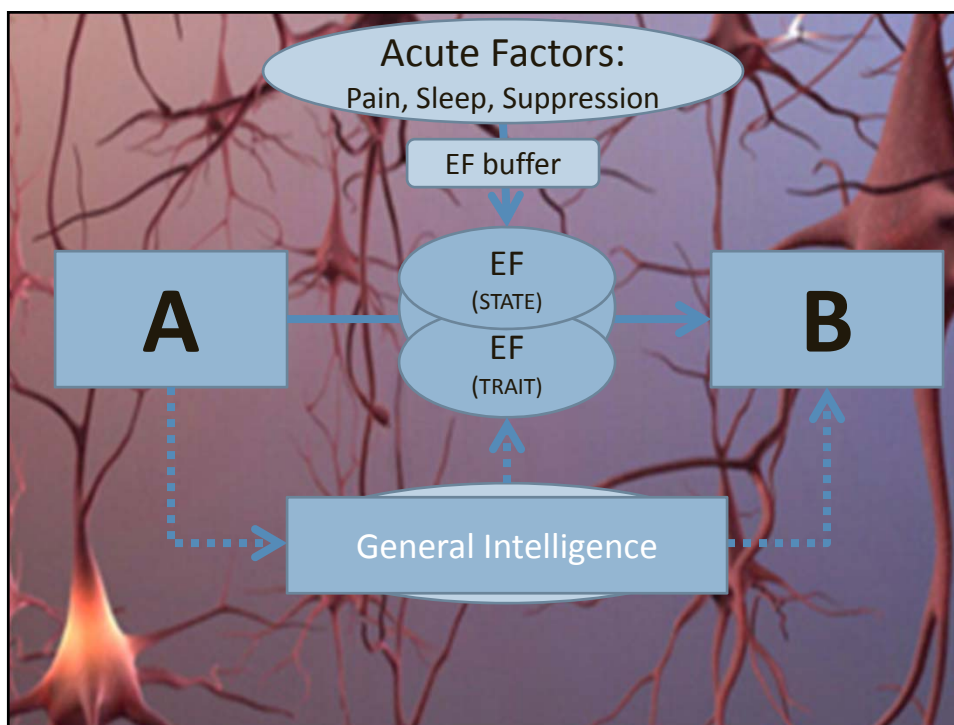
- Euler, Niermeyer, & Suchy (2015). *Neuropsychology*, doi.org/10.1037/neu0000219
- Suchy, Kraybill, & Franchow (2011). *JINS*, 17, 101-111.





9.06 Interpreting Assessment Results

- When interpreting assessment results, including automated interpretations, psychologists take into account the purpose of the assessment as well as the various test factors, test-taking abilities and other characteristics of the person being assessed, such as situational, personal, linguistic and cultural differences, that might affect psychologists' judgments or reduce the accuracy of their interpretations. They indicate any significant limitations of their interpretations.



Ecological Validity: Personal Factors

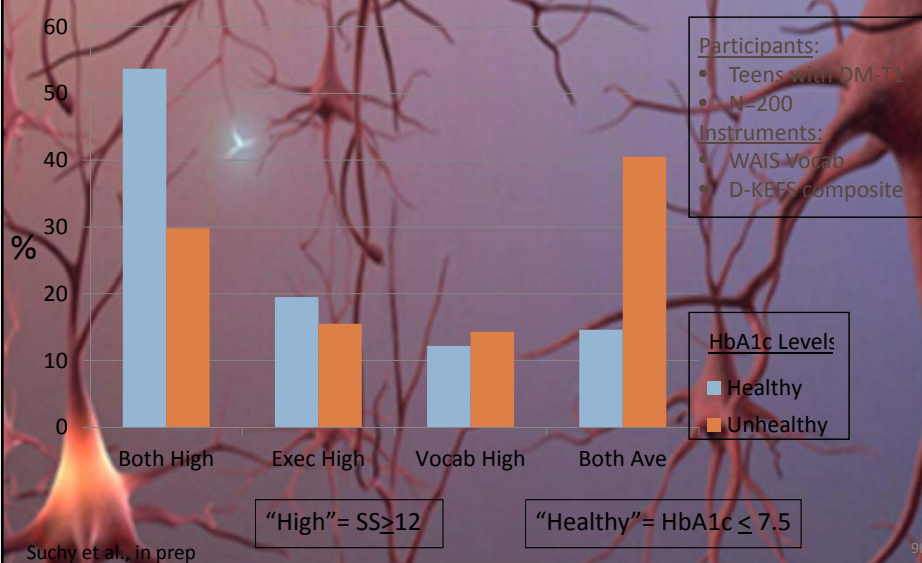
- IQ
 - Contributes independently (above and beyond EF) to functionality (e.g., IADLs, meds management)
 - TBI (Perna et al., 2012)
 - Schizophrenia/bipolar (Maeda et al., 2006; Martinez-Aran et al., 2009)
 - Older adults (Hart & Bean, 2011; Suchy et al., 2010)
 - Protective impact of high IQ vs. deleterious impact of low IQ
 - Teens with Type 1 Diabetes (Suchy et al., in prep)

REFERENCES:

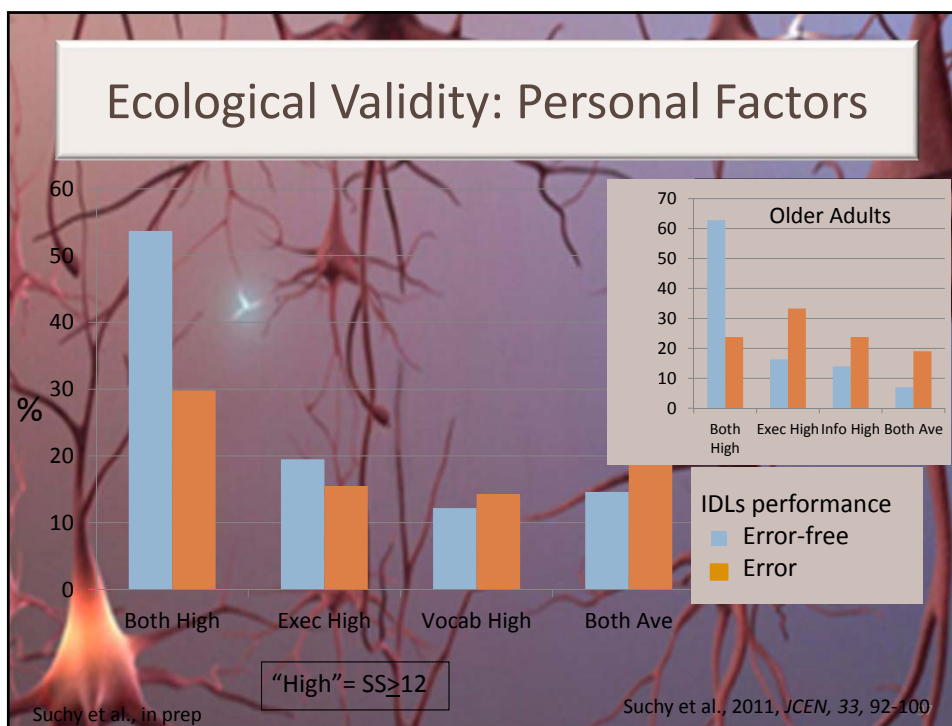
Hart, R. P., & Bean, M. K. (2011). *Aging, Neuropsychology, and Cognition*, 18(1), 64-85
 Maeda et al (2006). *Psychiatric Services*, 57(8), 1203-1205.
 Martinez-Aran et al., 2009 *Journal of Clinical Psychiatry*, 70(7), 1017-1023.

95

Ecological Validity: Personal Factors



96

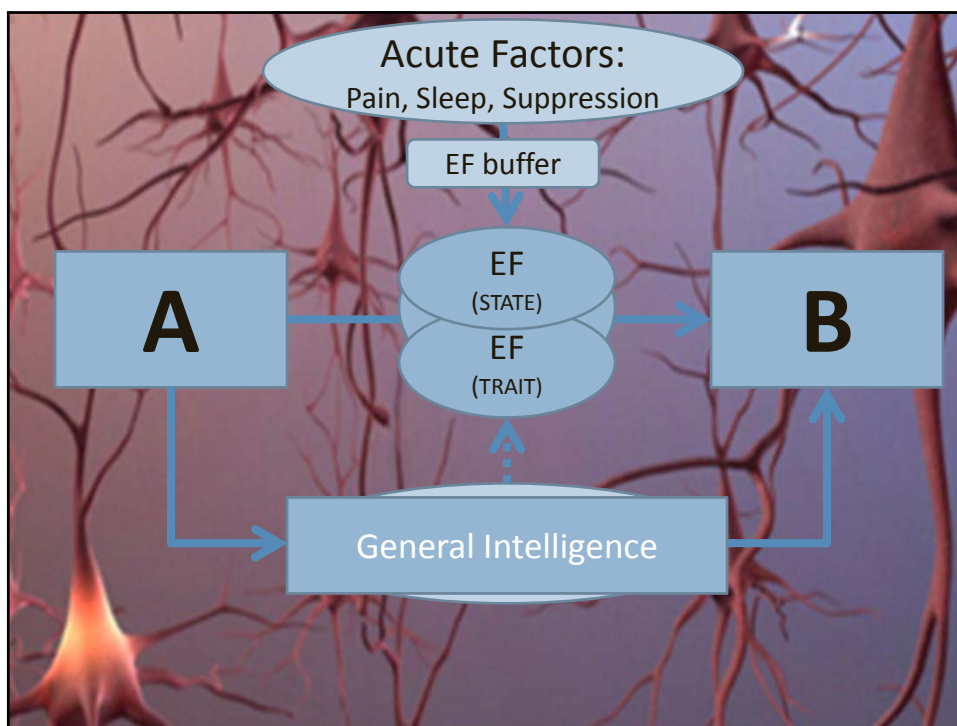


Ecological Validity: Personal Factors

- IQ
 - Contributes independently (above and beyond EF) to functionality (e.g., IADLs, meds management)
 - Protective impact of high IQ vs. deleterious impact of low IQ
 - Needed for insight about limitations (Suchy et al, 2011)
 - Insight associated with above average IQ
 - Error-free IADLs associated with
 - Normal EF & memory
 - Above average IQ

Suchy et al., 2011, *JCEN*, 33, 92-100

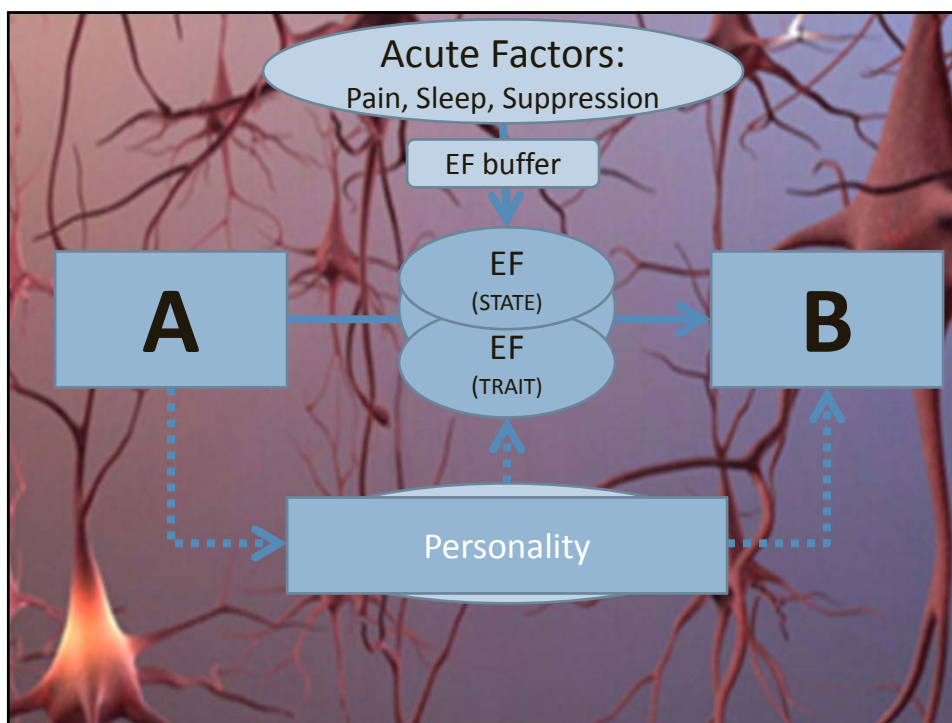
98



Ecological Validity: Personal Factors (cont'd)

- IQ
 - Ramifications
 - To err is human
- BUT
- If error-free performance is crucial **AND** If task is complex, intervention is needed for individuals with average to below-average IQ
- High IQ is a protective factor, also due to better insight

100



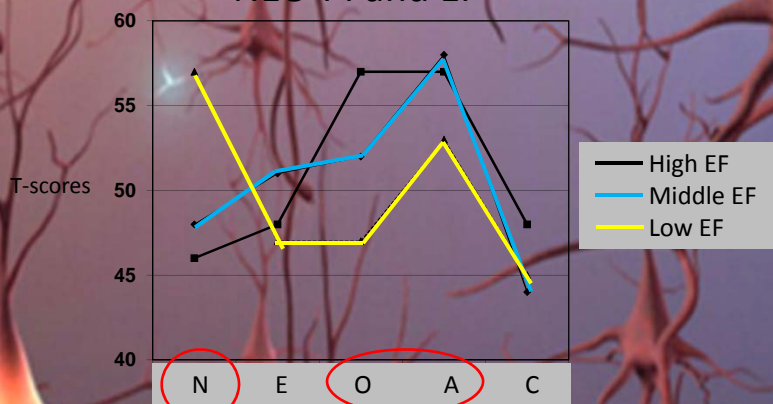
Ecological Validity: Personal Factors (cont'd)

- Personality
 - “Big Five”
 - Neuroticism
 - Extraversion
 - Openness to Experience
 - Conscientiousness
 - Agreeableness
 - NEO-PI

REFERENCES:
 De Fruyt... & Costa, (2009). *Assessment*, 16(3), 301-311.
 Wilberg ...& Costa (2009) *Journal of Nervous and Mental Disease*, 197(3), 187-195. 102

Ecological Validity: Personal Factors (cont'd)

NEO-PI and EF



REFERENCES:

Williams, Suchy, & Kraybill (2010). *Journal of Research in Personality*, 44(4), 485-491.
Murdock, Oddi, & Bridgett (2013). *Journal of Individual Differences*, 34(2), 97-104.

103

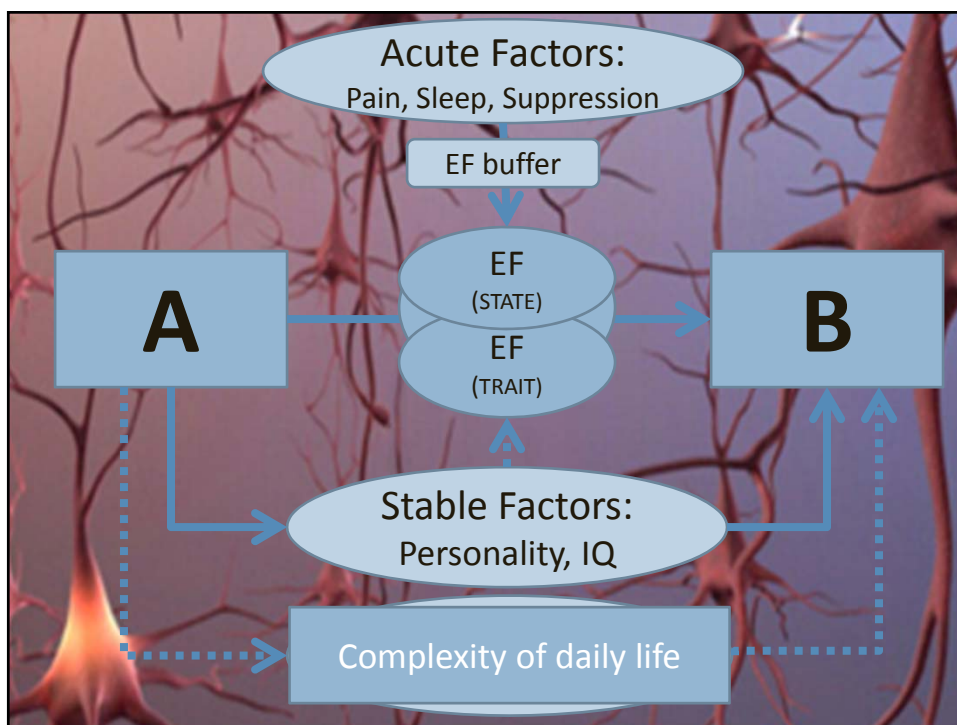
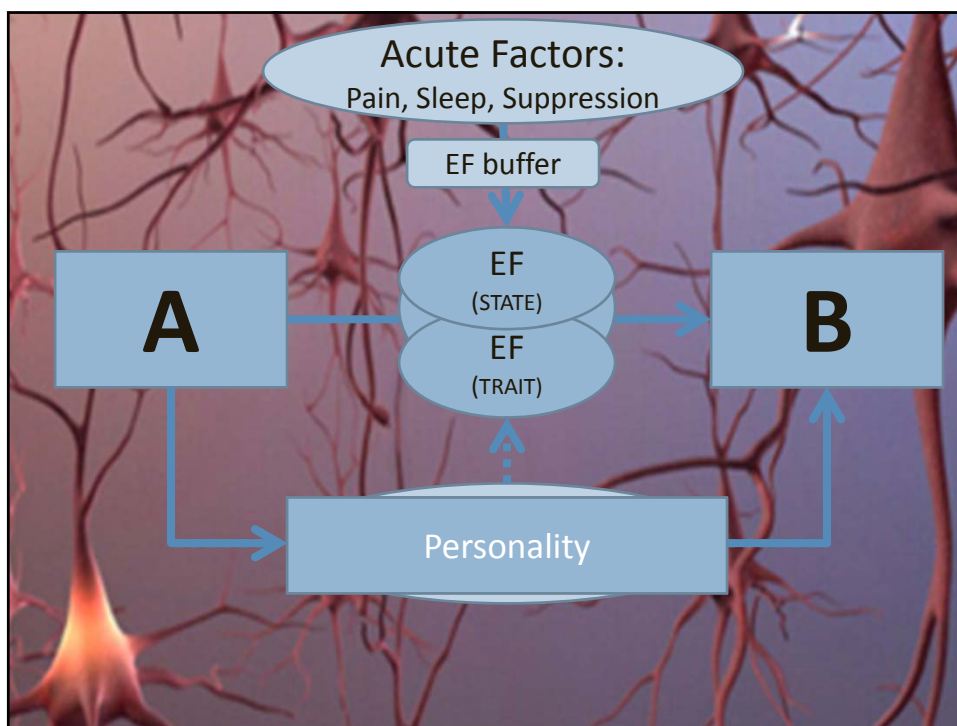
Ecological Validity: Personal Factors (cont'd)

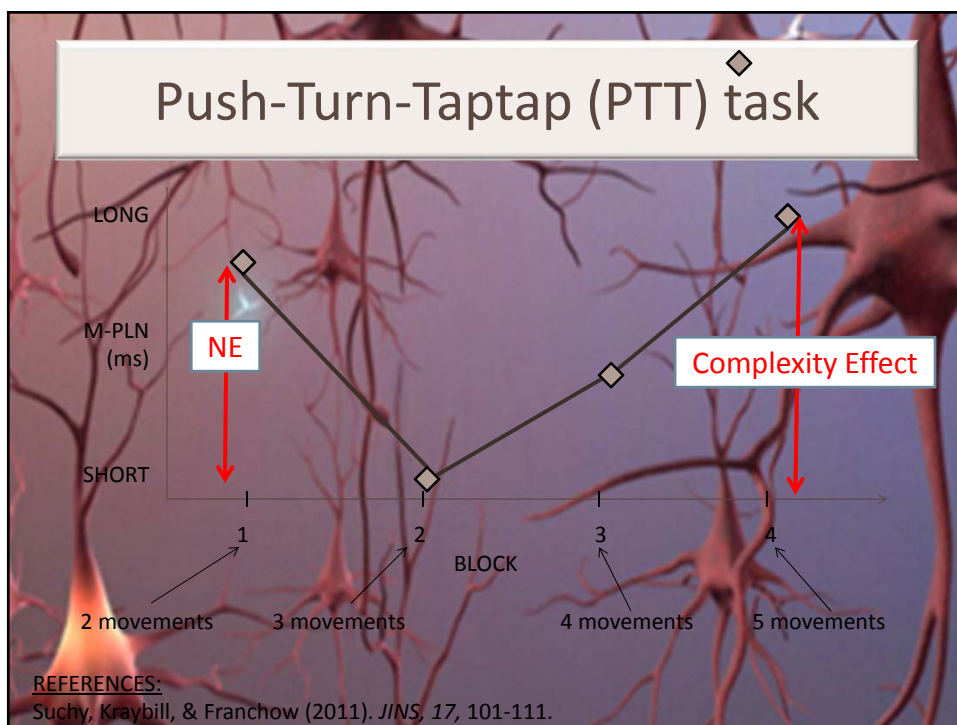
- Personality
 - Older adults
 - Higher Openness and Agreeableness associated with better IADL performance
 - Higher Conscientiousness associated with denial of IADL problems
 - But NOT related to actual IADL performance
 - Declines in Openness signal incipient declines in cognition and loss of functionality

REFERENCES:

Pocnet et al. (2013). *Personality and Individual Differences*, 54(2174-179
Suchy et al., (2010). *Journal of Gerontology, Series B*, doi: 10.1093/geronb/gbq037.
Williams, Suchy, & Kraybill (2013). *Journal for Research in Personality*.

104



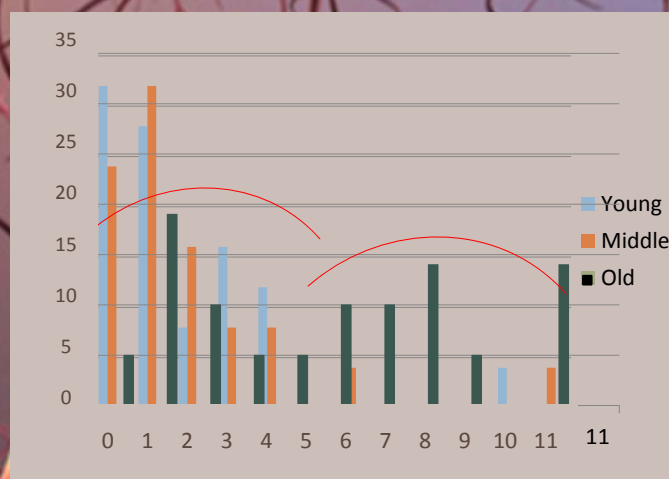


Push-Turn-Tap (PTT) task

- Hyperkinetic perseveration



Hyperkinetic Perseveration



REFERENCES:

Suchy, Lee, & Marchand (2013). *Neuropsychologia*, 51 (11), 2130-2141.

Hyperkinetic Perseveration

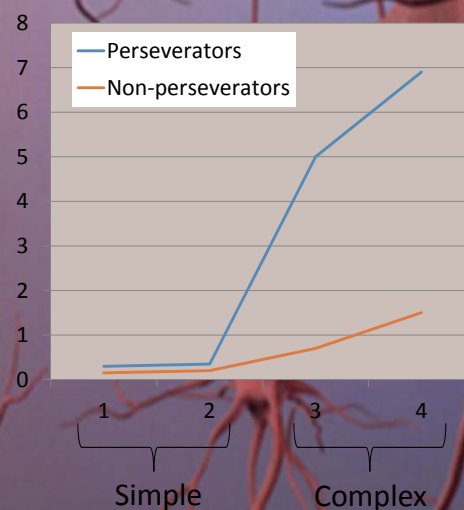
Blk 1: Push, Tap-tap
Blk 2: Turn, tap-tap, push, turn
Blk 3: Push, turn, push, tap-tap, turn
Blk 4: Turn, push, tap-tap, turn, push

Perseverators:

- 61% made NO errors on block 1
- 68% made NO errors on block 2

BUT

- Larger SD of tap-tap latency across all 4 blocks



REFERENCES:

Suchy et al. (2013). *Neuropsychologia*, 51 (11), 2130-2141.

Ecological Validity, Verisimilitude, and Hyperkinetic Perseveration

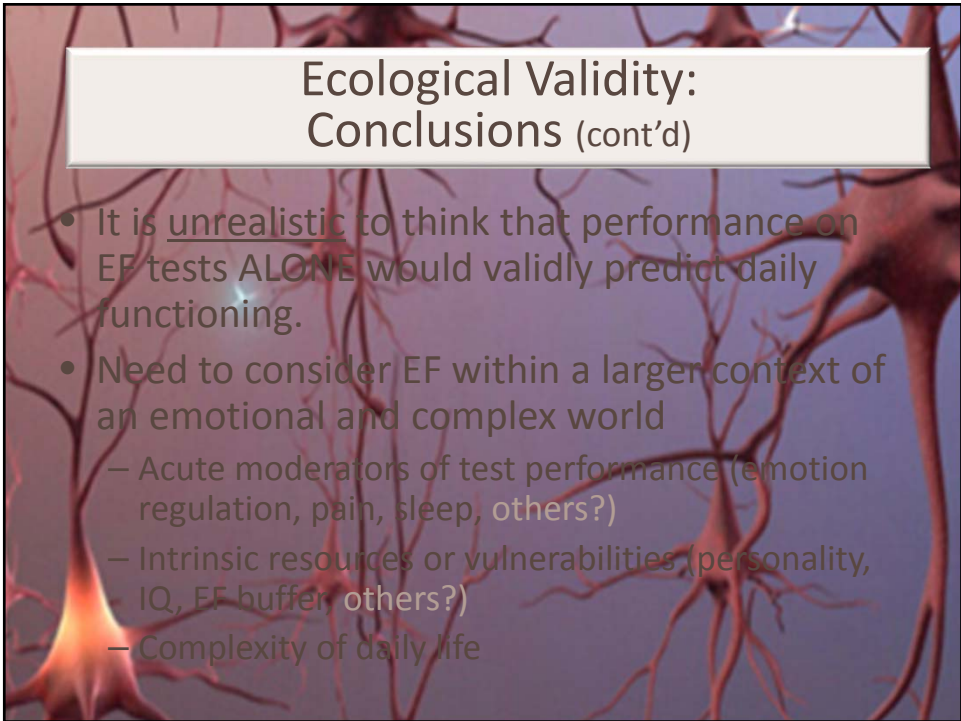


Grandma, no, listen to me: I said DOUBLE-click on the icon.



Ecological Validity: Conclusions

- Problems with EF assessment:
 - Not all EF sub-domains are assessed
 - Norms don't consider outcomes
 - Structured testing environment
 - Lapses are erratic, EF fluctuates
 - Other person- and context-specific factors



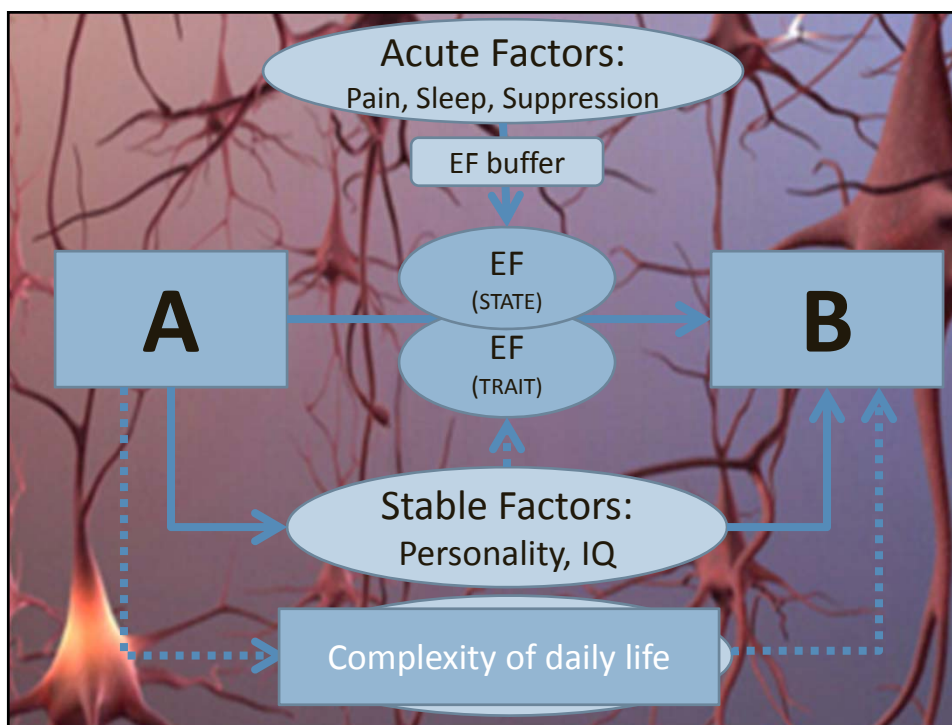
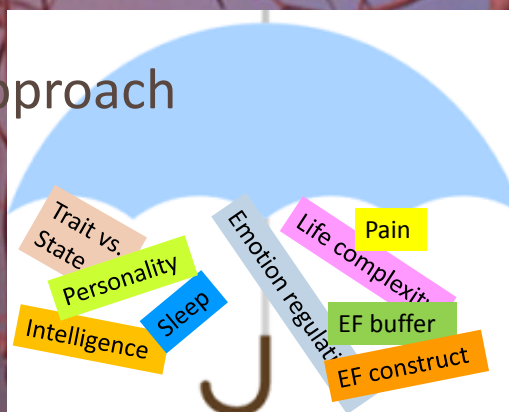
Ecological Validity: Conclusions (cont'd)

- It is unrealistic to think that performance on EF tests ALONE would validly predict daily functioning.
- Need to consider EF within a larger context of an emotional and complex world
 - Acute moderators of test performance (emotion regulation, pain, sleep, others?)
 - Intrinsic resources or vulnerabilities (personality, IQ, EF buffer, others?)
 - Complexity of daily life

Ecological Validity: Conclusions (cont'd)

ConVExA approach

Contextually
Valid
Executive
Assessment



Ecological Validity: Conclusions (cont'd)

- What can you do about it now
 - Include tests of SC and MT
 - Use population based norms (but NOT for Dx!)
 - Do NOT ignore single poor performance over erratic performance within one session
 - A potential for lapses at home
 - May signal a poor “buffer”
 - Potential for lapses increases with average to below average IQ—consider this if error-free performance is crucial (safety, health, etc.)

Ecological Validity: Conclusions (cont'd)

- What can you do about it now (cont'd)
 - High IQ is a protective factor against lapses, in part due to better insight
 - High Openness and Agreeableness are protective factors against lapses
 - High Conscientiousness is a risk factor, due to a tendency to deny problems
 - Task complexity is in part defined by the complexity of daily life

Reliability and Construct Validity: Conclusions

- Be thoughtful about the EF construct
- Use composites of multiple EF scores to improve reliability and stability
- Do NOT interpret individual EF tests as reflecting a specific component of EF

119

Summary of Ethical Challenges

- Construct validity
 - A lack of conceptual understanding and a definition of the EF construct
- Reliability
 - Poor stability of the EF construct
- Ecological validity
 - Limited reliance on larger contextual factors

120

Learning Objectives

- By the end of the workshop, participants will be able to
 1. Describe the APA ethical standards that are challenged by typical clinical methods of assessing executive functions (EF).
 2. List limitations in validity and reliability of typical EF measures.
 3. List ways in which emotional processes contribute to and detract from valid, reliable, and interpretable EF assessment.
 4. Describe ways in which clinical practice can be modified to improve adherence to APA ethical standards.

121