Addiction Therapy-2014

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Sara Jo Nixon

Neurobehavioral Challenges in Recovery: Exploring their Breadth & Treatment Implications

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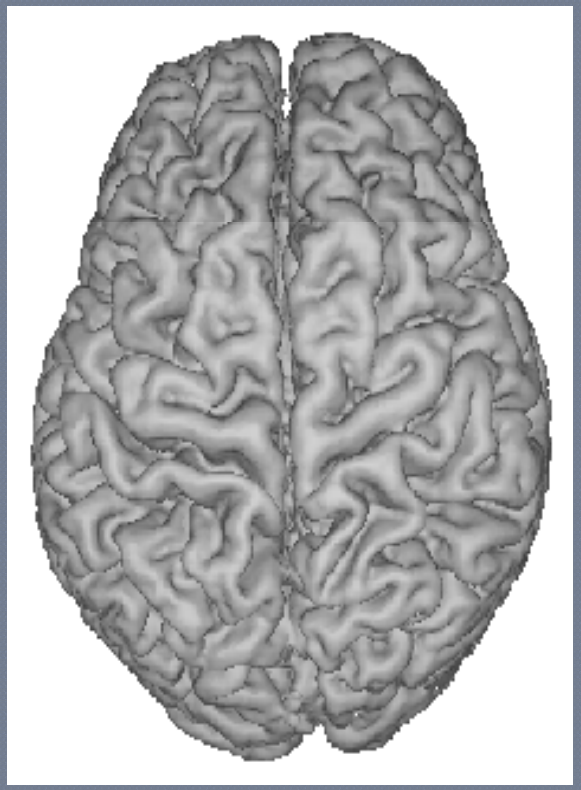
Addiction Research & Therapy
August 5, 2014



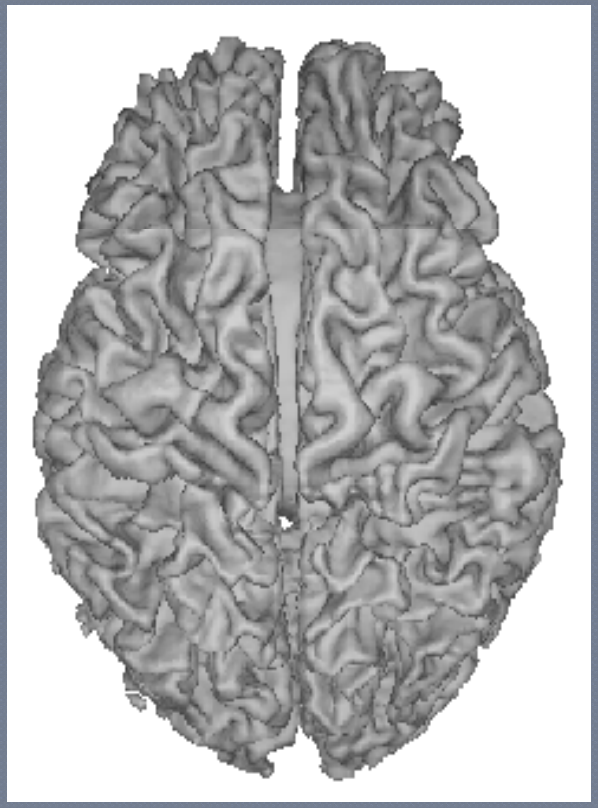
Structural Changes

Magnetic Resonance Imaging (MRI)

Control

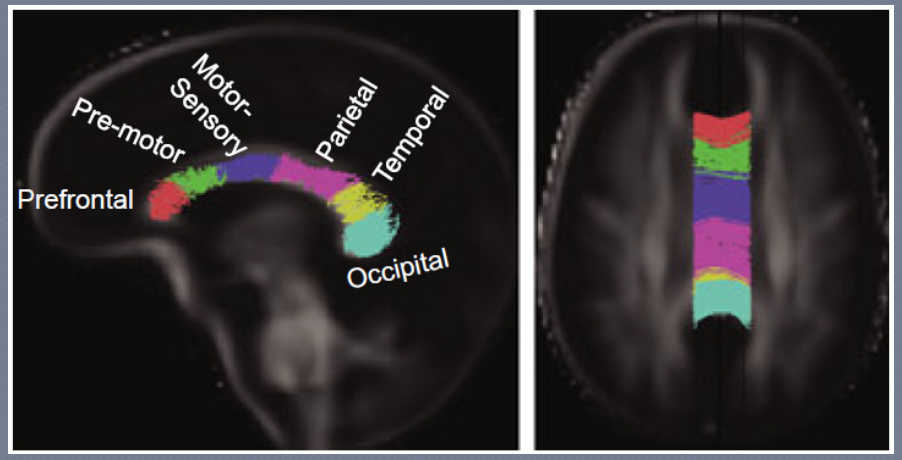


Alcoholic

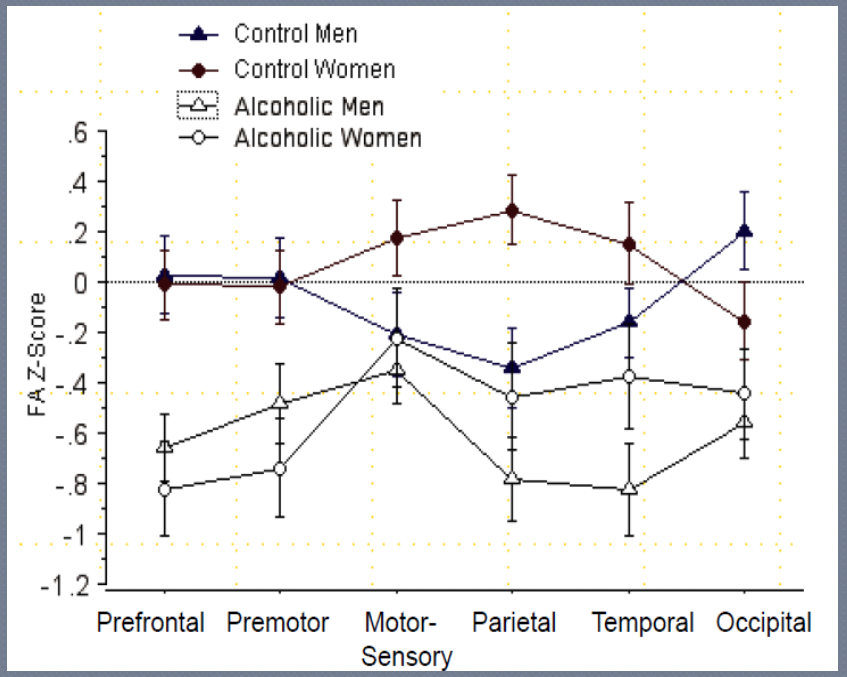


Diffusion Tensor Imaging (DTI)

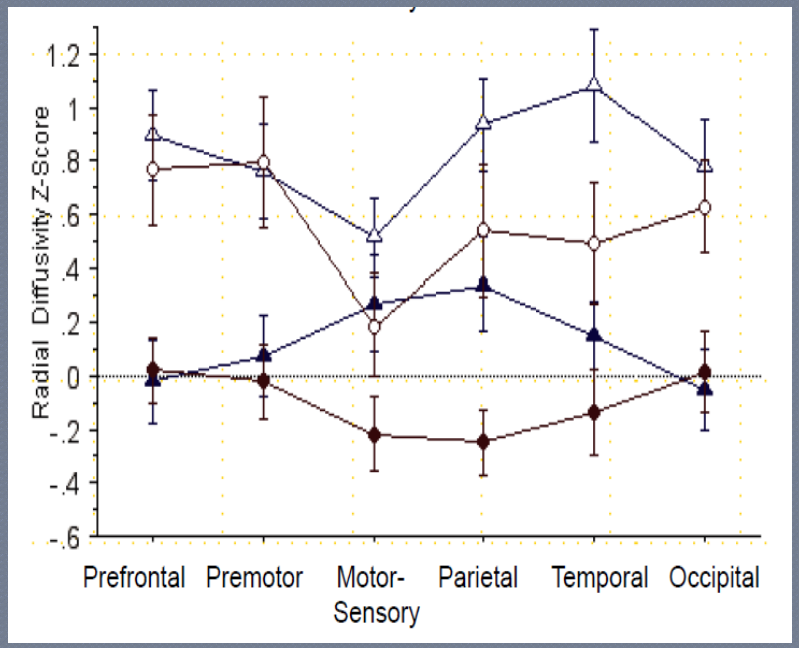
A.



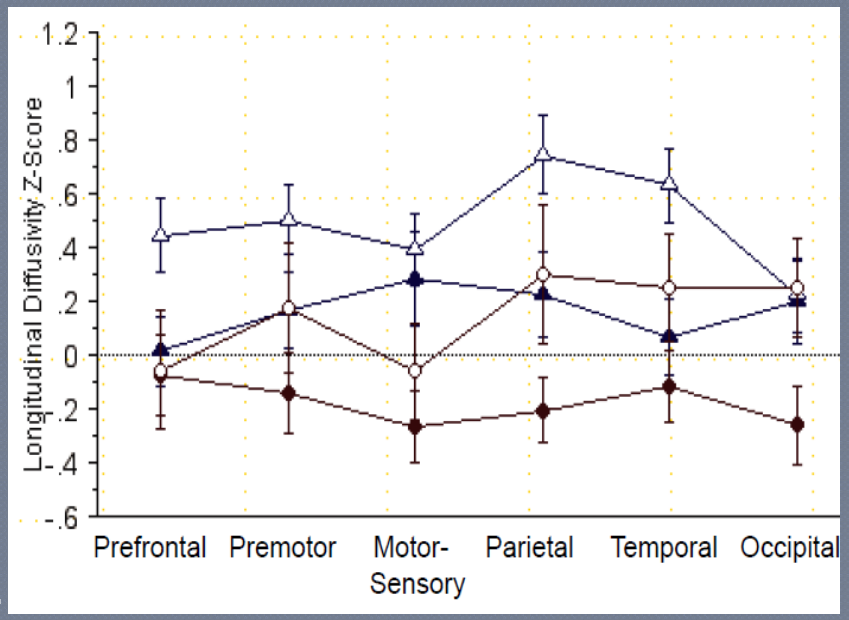
B.



C.



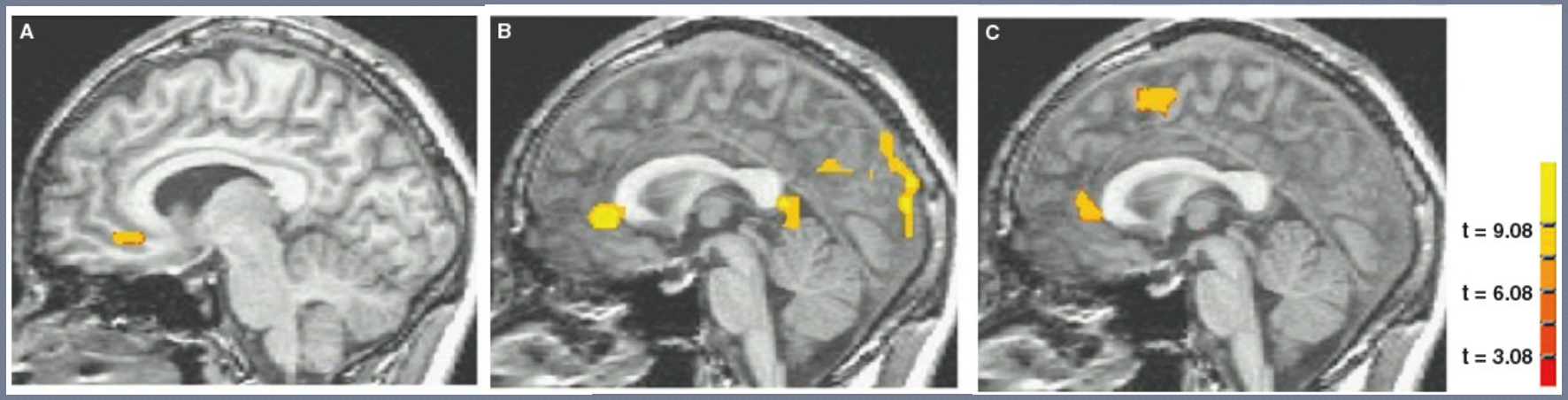
D.



FA (5/6) ; ƛT (6/6); ƛL: (3/6: PM, Parietal, Temporal)

Pfefferbaum, A., et al (2010). *ACER, 34*(7), 1201-11.

Functional MRI (fMRI): Emotional Evaluation



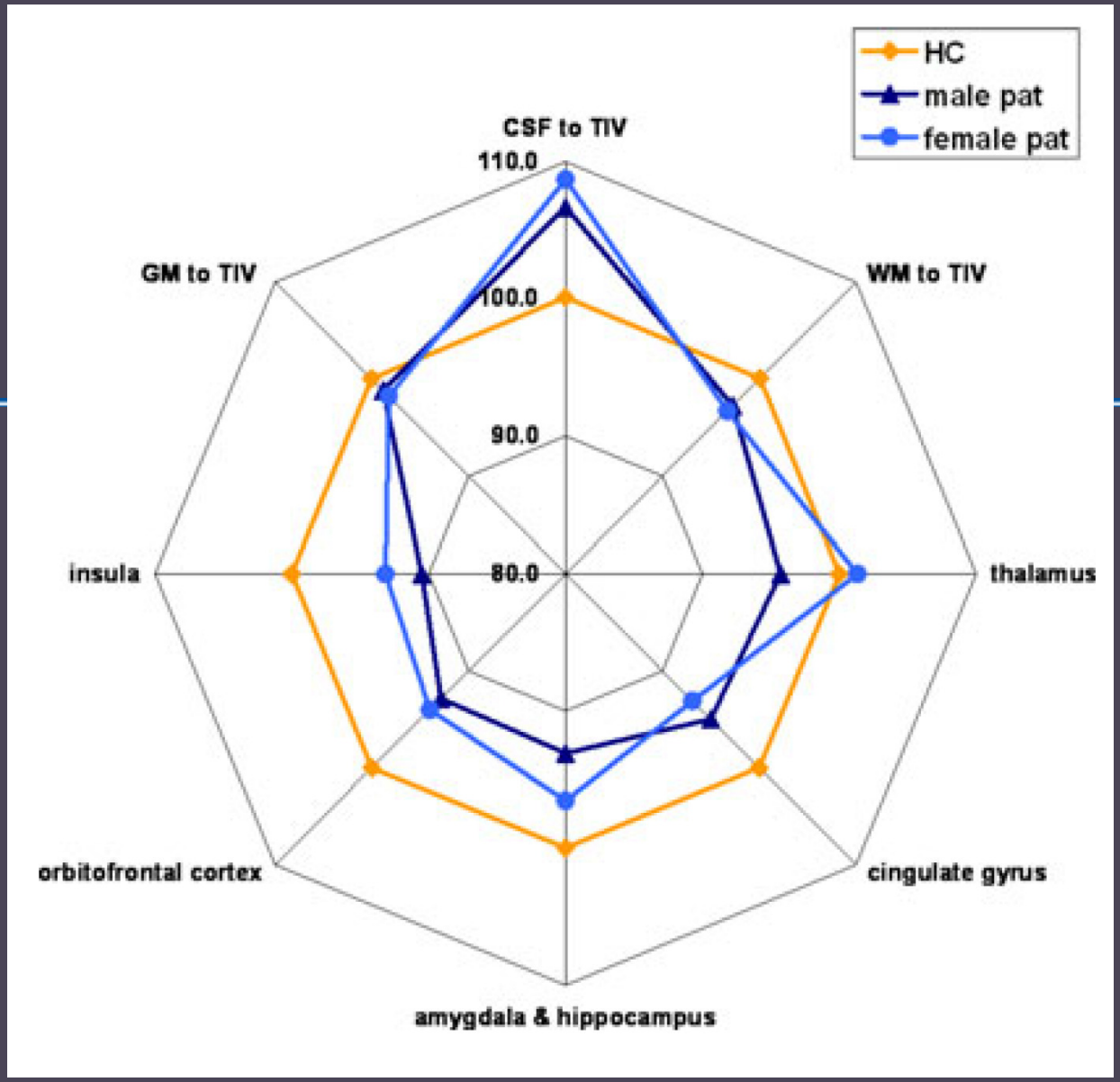
SAD Faces

FEAR Faces

DISGUST Faces

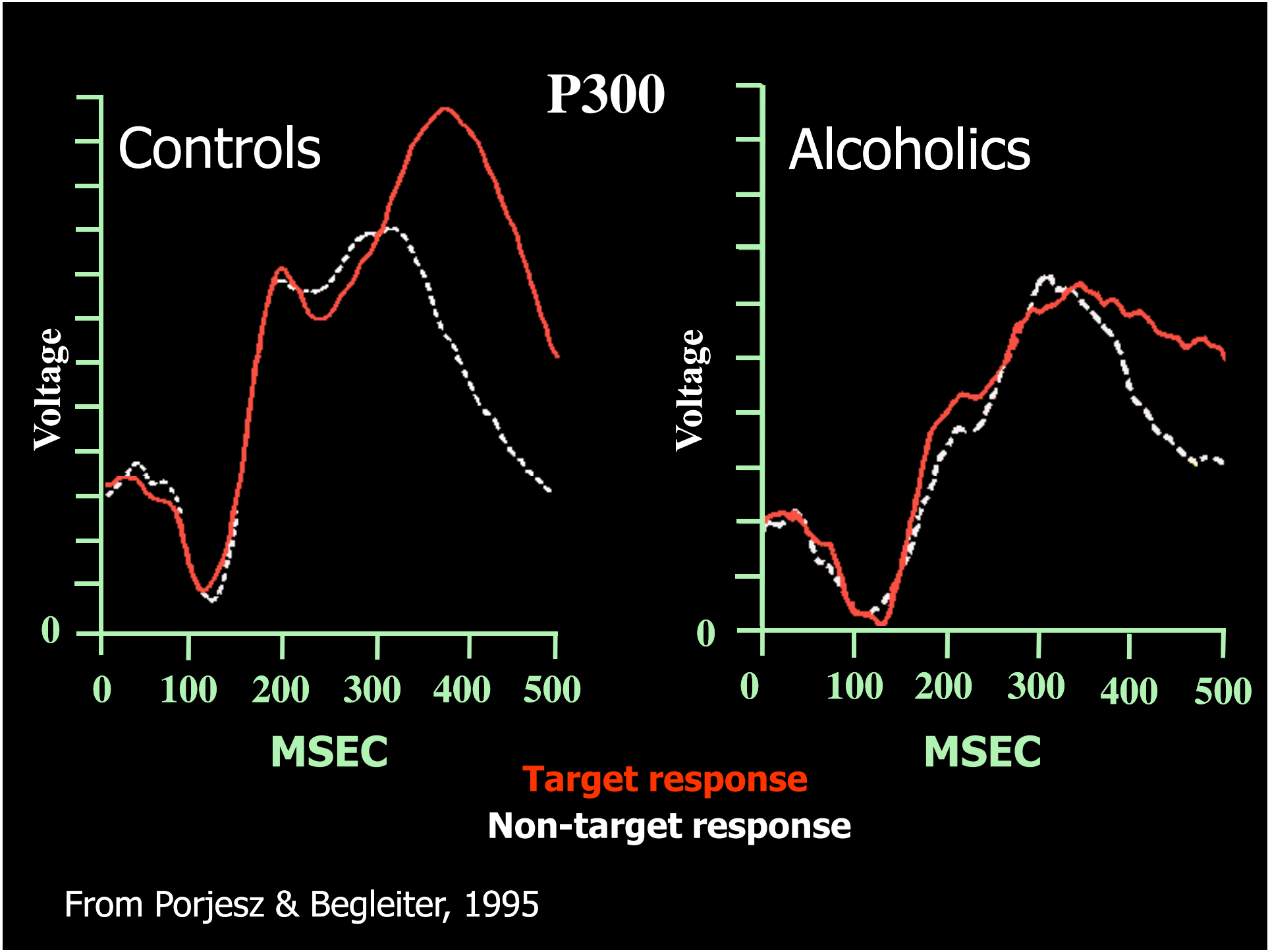
Salloum, et al. (2007). *ACER, 31(9), 1490-1504.*

Gender, Alcohol & Brain Volume



Global gray matter (GM) and white matter (WM) volume loss, global cerebrospinal fluid (CSF) increase and regional volume loss in regions of interest, relative to healthy control values (=100%), controlled for gender; orange = healthy controls, dark blue = male alcoholic, light blue = female alcoholic. HC, healthy controls; TIV, total intracranial volume.

Demirakca et al., 2011

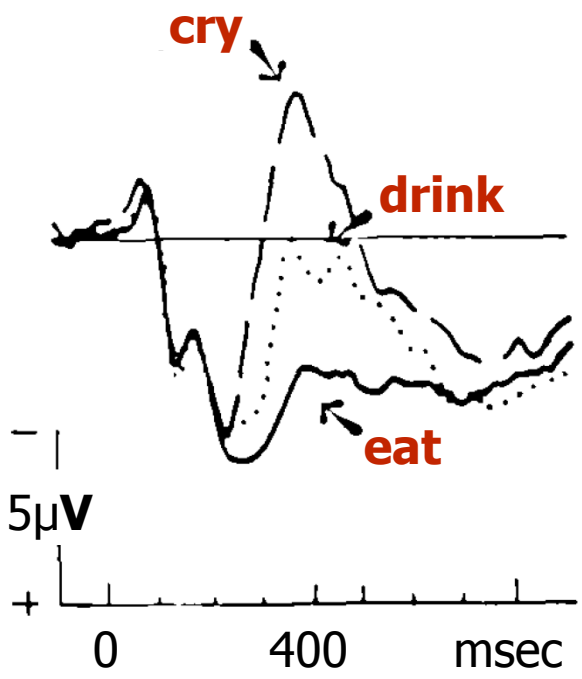


From Porjesz & Begleiter, 1995

Semantic Inefficiency?

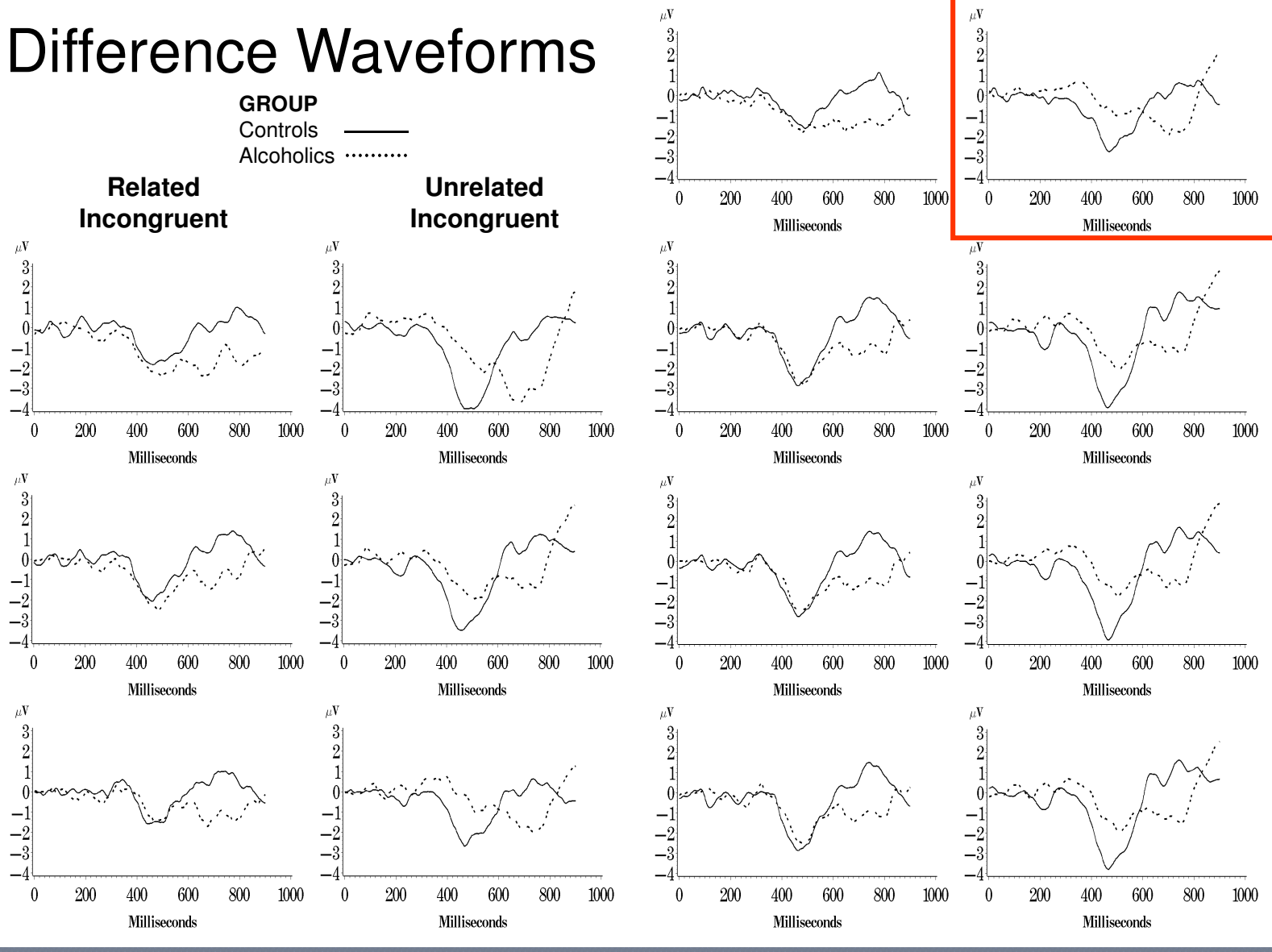
N400: Negative component of the event-related potential; occurs 300-650 milliseconds following presentation of an unexpected, incongruent stimulus.

The pizza was too hot to ___.



Bentin, 1989

Difference Waveforms



Nixon et al., 2002

- "We'll eventually learn what all the twinkling of the neurons means *in terms of our behavior and that's what really matters*." Bill Newsome, Nature, 499, July 18, 2013, p 274 (interview/discussion, pages 272-274, written by Alison Abbott, Nature's senior European Correspondent)

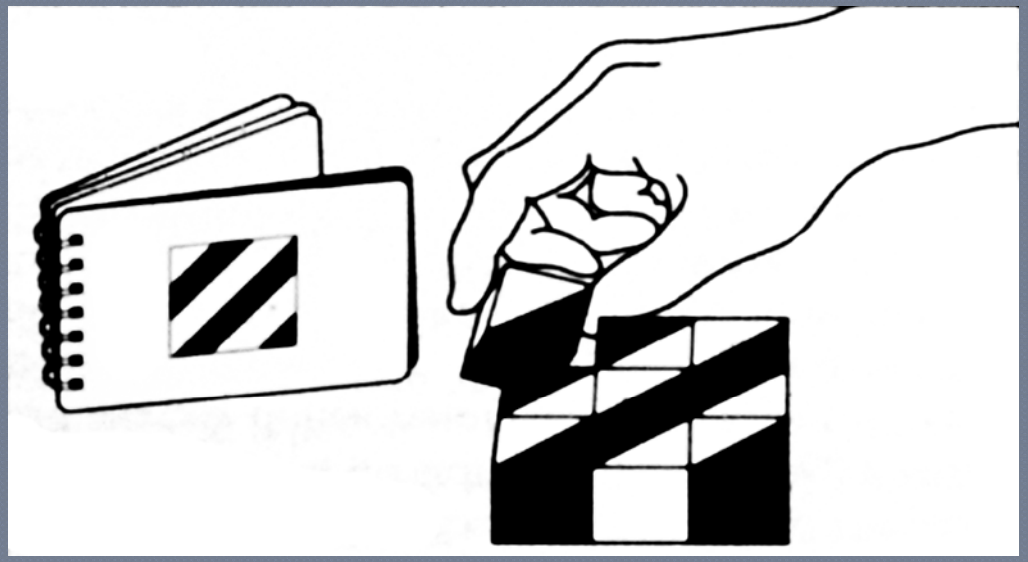
- Dr. Newsome is co-chair, BRAIN Initiative

Emphasis added by SJN

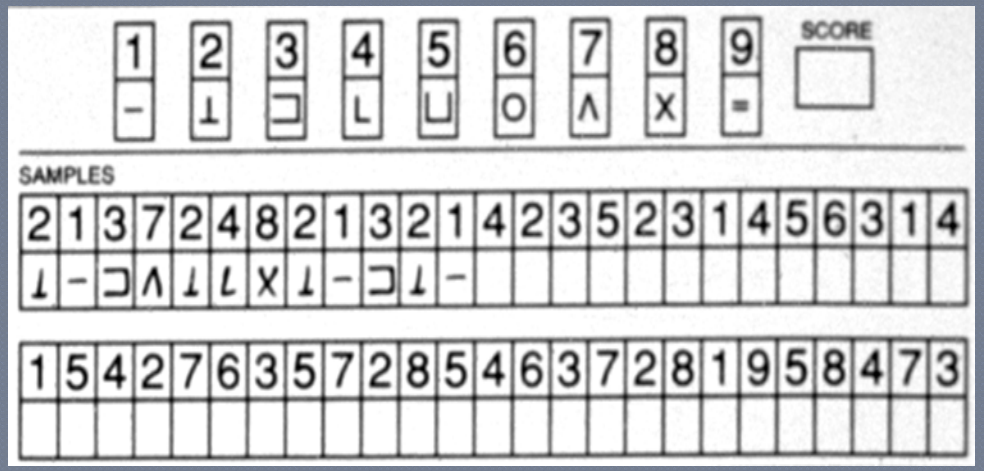
Neuropsychology and Functional Domains

- Executive functions /Problem-solving/Abstracting
- Verbal Learning and Memory
- Visual-spatial Learning and Memory
- Perceptual –motor skills
- Language reception/production

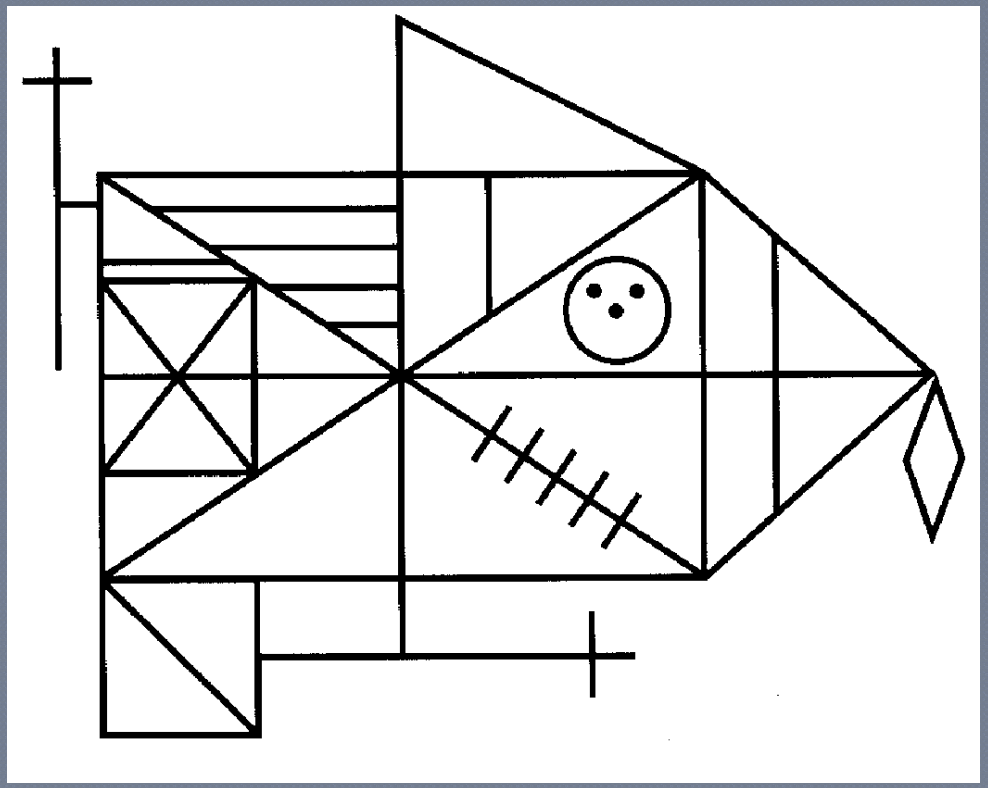
Exemplar Neuropsychological Tests

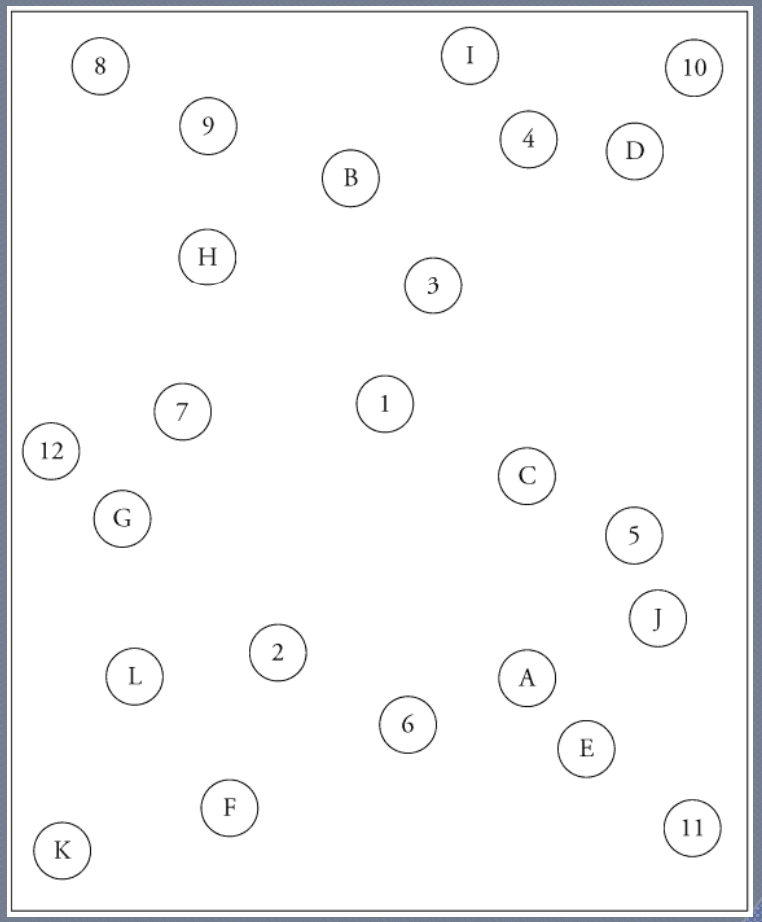






LIST ALL THE WORDS YOU CAN THINK OF THAT BEGIN WITH THE LETTER "F", "A", "S"




8
I
10
9
4
D
B
H
3
7
1
12
C
G
5
J
2
L
A
6
E
F
11
K

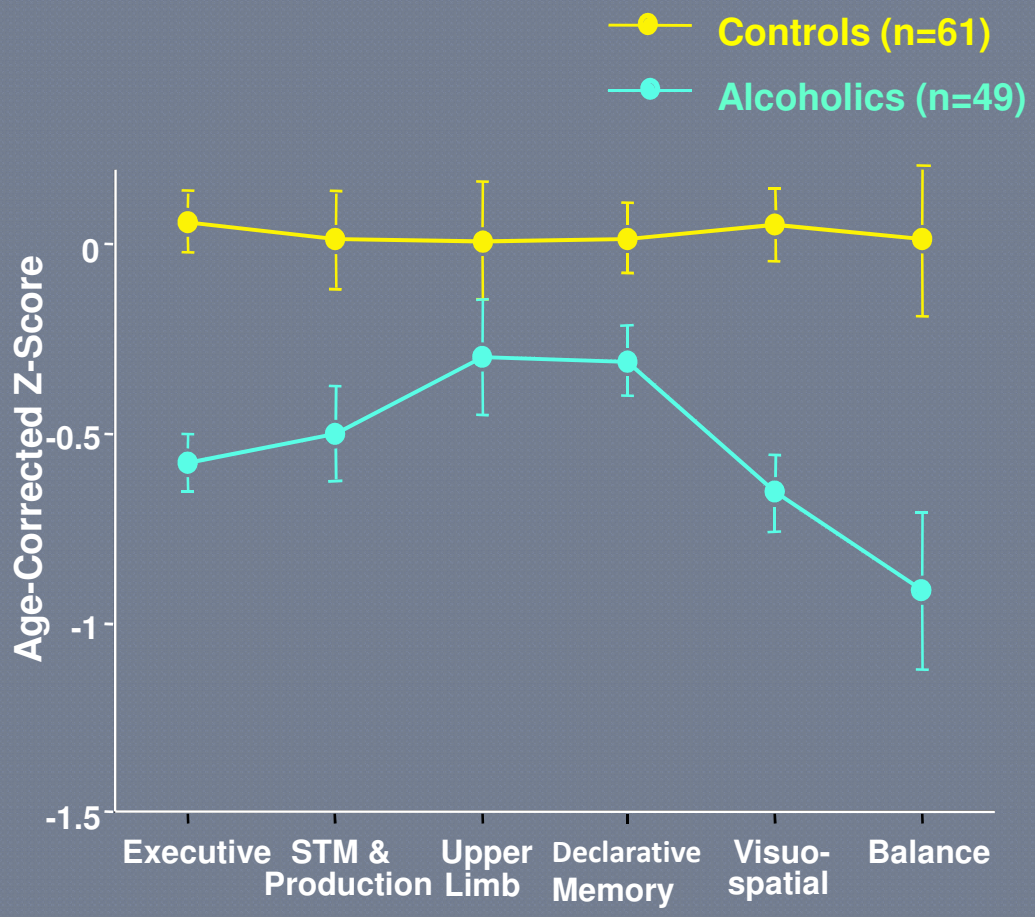
Exemplar Neuropsychological Tests

LOGICAL MEMORY I Administer both stories. Score 1 point for each correct item (see Appendix A in Manual for Scoring Criteria).	Score
Story A	
Anna / Thompson / of South / Boston /, employed / as a cook /	_____
in a school / cafeteria /, reported / at the City Hall / Station /	_____
that she had been held up / on State Street / the night before /	_____
and robbed / of fifty-six dollars /. She had four /	_____
small children /, the rent was due /, and they had not eaten /	_____
for two days /. The police /, touched by the woman's story /,	_____
took up a collection / for her /.	_____

Wechsler, 1987; Evert & Oscar-Berman, 1995

Chronic Alcohol: Effects on Brain Function

- Alcoholic Cognitive and Motor Dysfunctions include:
  - Executive Fx
  - Short term memory
  - Visuospatial ability
  - Balance and postural stability



Sullivan et al, 2000, Alc Clin Exp Res

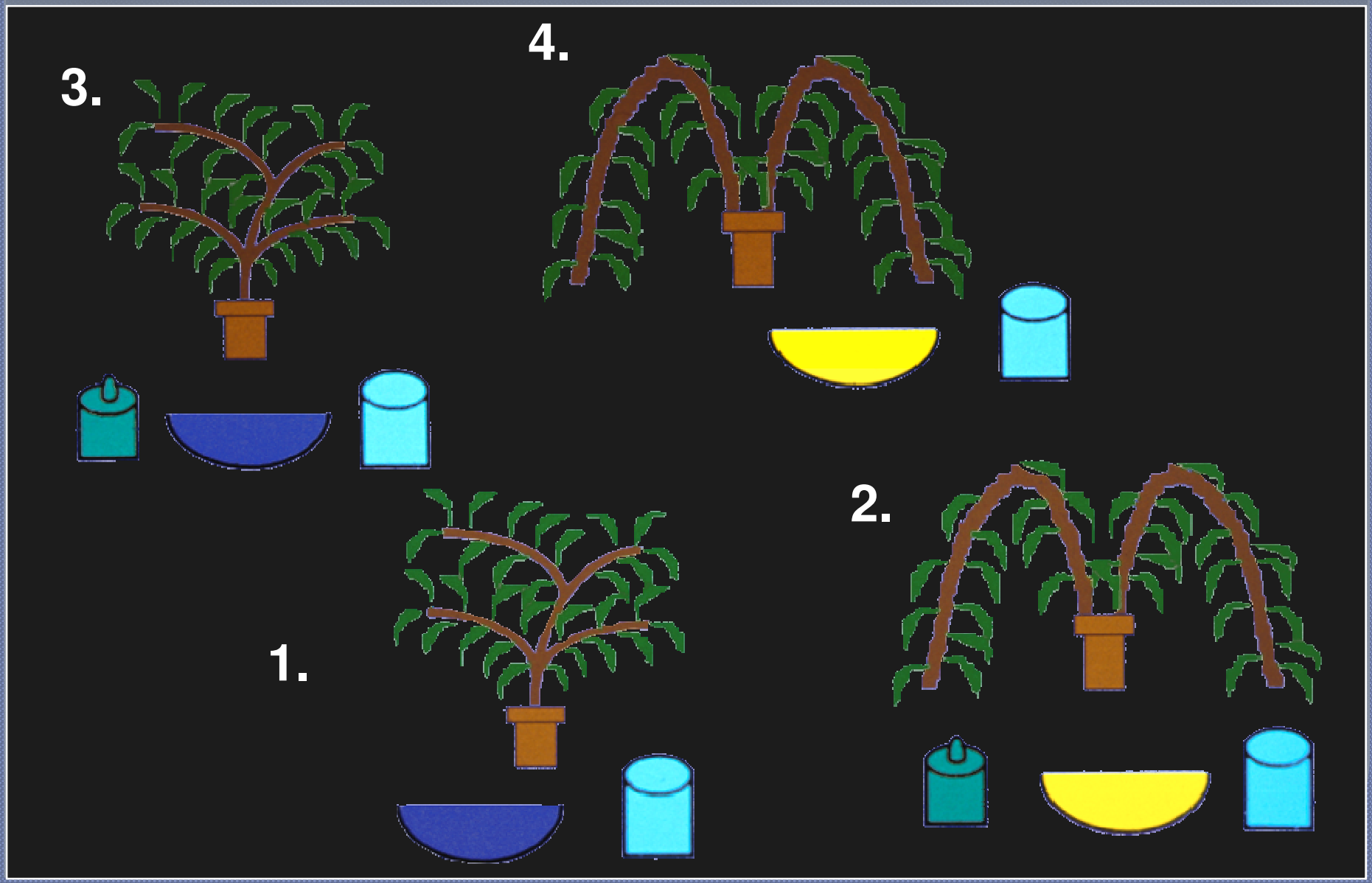
Summary Observations

- Widespread neurobehavioral consequences
- Typically “subclinical”
- Performance “deficits” relative to community comparison groups
- Heterogeneous; percentage affected ranges from ~ 50% - 80/85%

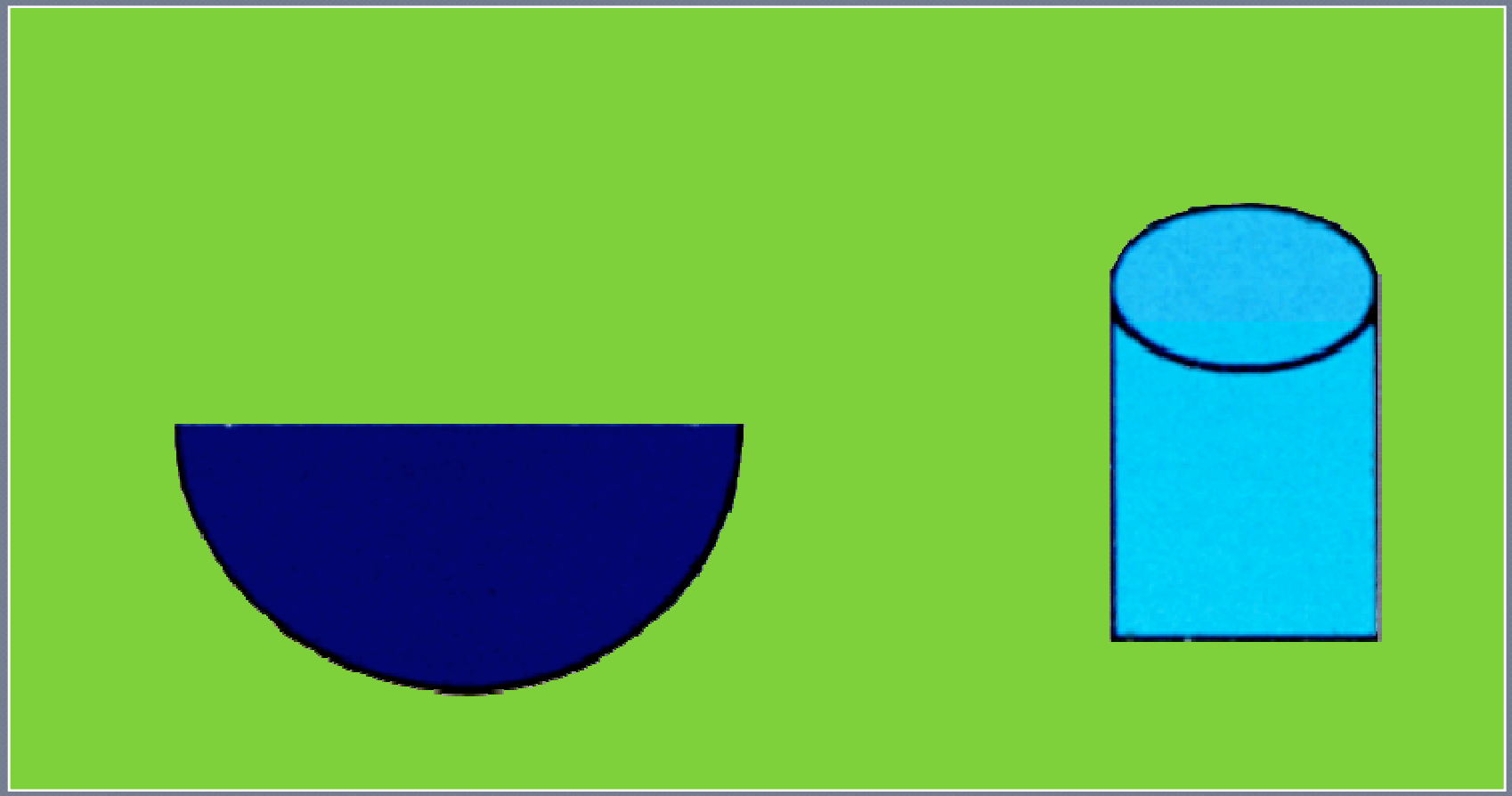
And What does this mean?

Impersonal Problem-Solving

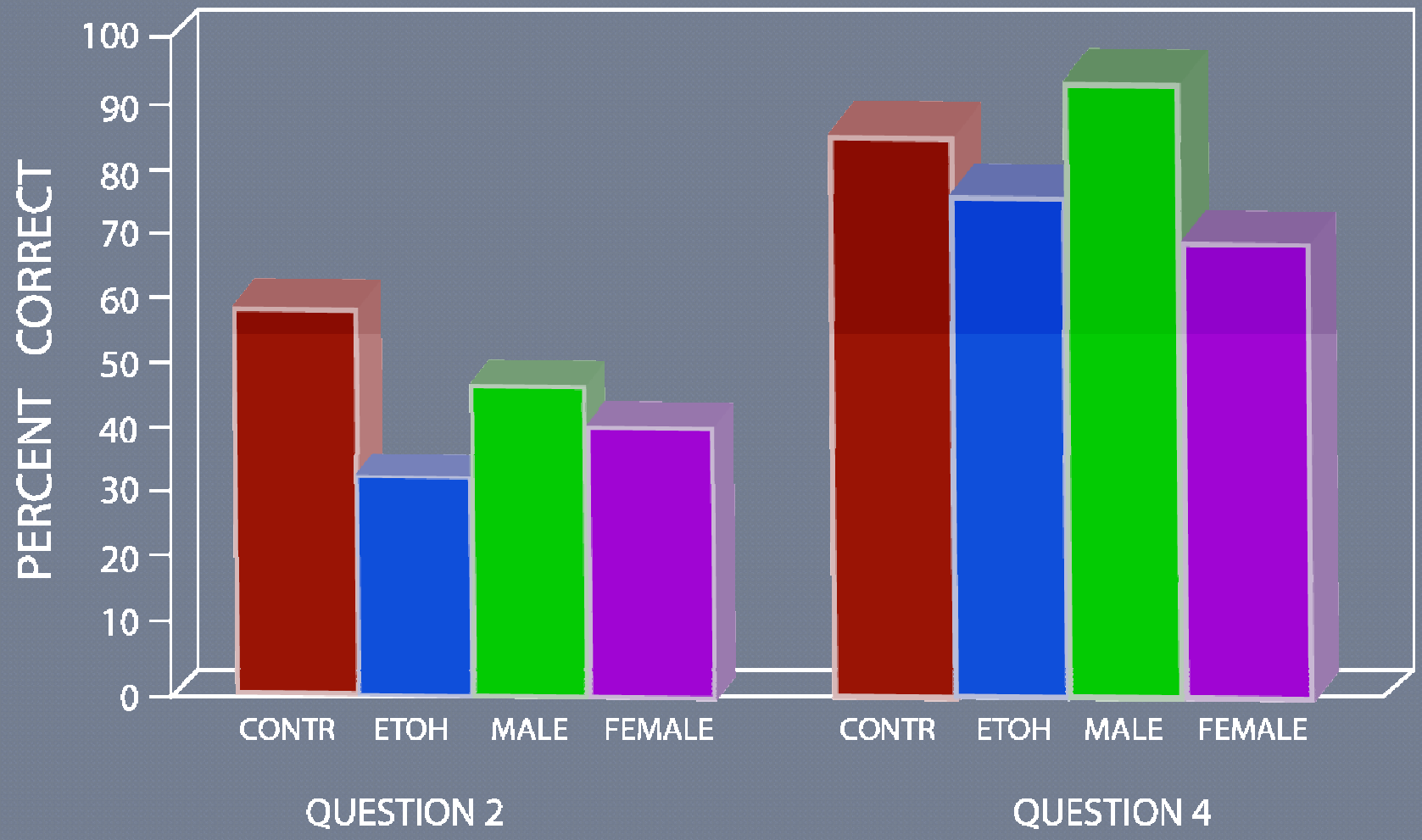
Plant Task



Plant Task



Plant Task



Nixon & Parsons, 1991

Grocery Shopping Task

- Laloyaux et al, 2012
- NP Battery: processing speed, verbal memory, cognitive flexibility, inhibition
- Computerized shopping task
  - Time in aisle, etc
  - Selection of correct/unique items
  - Referencing list, etc
- Most robust difference: Total Time
  - Correlated with NP variables
  - Everyday activities
  - Duration of illness

- Interpersonal Problem-Solving

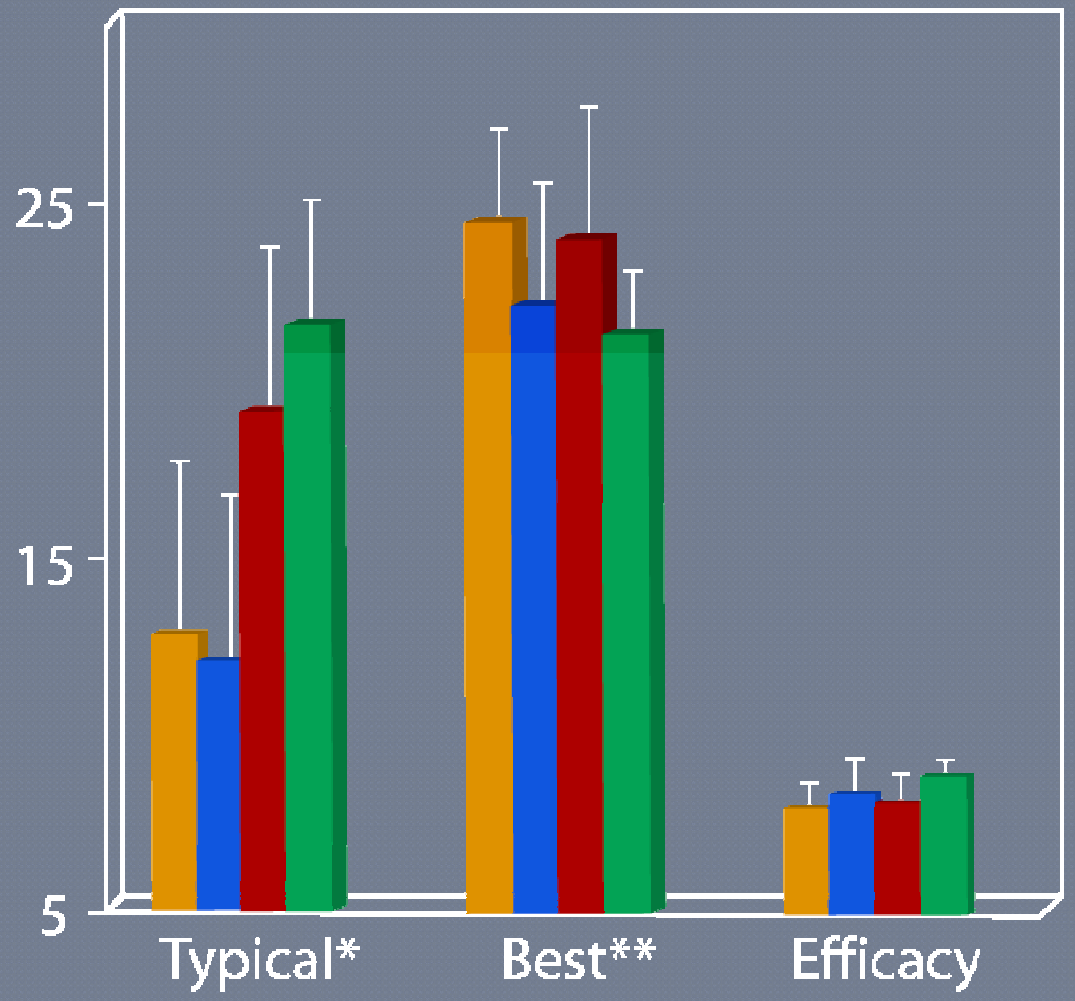
Adaptive Skills Battery , ex 1

You tell a friend, in strictest confidence, your negative impressions and feelings about a mutual acquaintance. Later, you discover that what you said about the acquaintance has gotten back to that person. You feel really embarrassed and hurt that your friend would violate your confidence. What do you do?

Adaptive Skills Battery, ex 2

In spite of your repeated warnings, your long talks, and punishments, your child persists in coming home long after curfew you have set. One night you are waiting 45 minutes after the deadline and are really angry. She comes in, and as you begin to explain why you are angry, she yells at you. “Look you old fossil, I can’t live like you did back in the dark ages!” You really feel like you are about to blow up. How do you handle it?

Adaptive Skills Battery



Alco Females

Alco Males

Cntl Females

Cntl Males

* Significant group effect, p=0.0001

** Significant sex effect, p=0.003

Emotional Valence/Decoding

- Behavioral, Neurophysiological, Neuroimaging Evidence
  - Difficulty in labeling/intensity
  - May be linked to nature of expressed emotion
- Some evidence that deficits correlate with Interpersonal Problems
- Little systematic integration of Emotion & Cognition

Are these findings clinically relevant?

Potential Implications

- Complicate the array of stimuli persistently available
- Impede "appropriate" weighting of potential outcomes
- May contribute to the behavioral discounting aberrations
- Support "process" evaluation: examine "How/why" of achieving outcome
- Suggest continuing psychosocial problems

Are They?

- Predictors of treatment completion
- Predictors of abstinence
- Predictors of post-treatment adaptation (employment, family and social adjustment)



Interventions?

How can we apply our current level of understanding?

Specific Efforts

- Houben, Wiers, & Jansen (2011) Psychological Science, 22, 968-975
  - Web-based Recruitment/Intervention
  - Problem Drinkers
  - Audit ≥ 8 (M = 17.9 (5.77), range = 8-31; ~20 TC (11 women), 28 CC (14 women)
  - Mean age = 44.33 ± 15.37
  - Focus: WM ↑↓ & Drinking: Tested @ 1 wk & 1 month post-training

Specific Efforts (Design)

- ~25 sessions – all Ss (range 20-25), ~25 days
- TG: performance-dependent training
- CG: No training, easy level of difficulty
- Tests:
  - Visuospatial working memory
  - Backward Digit Span
  - Letter Span
- Implicit Association Test
- TLFB/week

Specific Efforts (Outcomes)

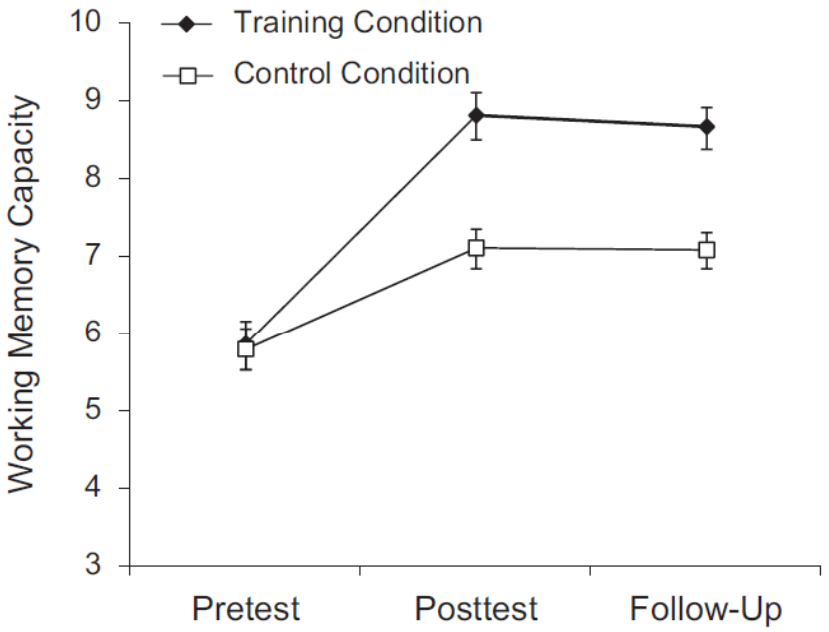


Fig. 2. Estimated marginal means for the working memory tasks at pretest, posttest, and follow-up, separately for participants in the training and control conditions. Error bars represent standard errors of the mean.

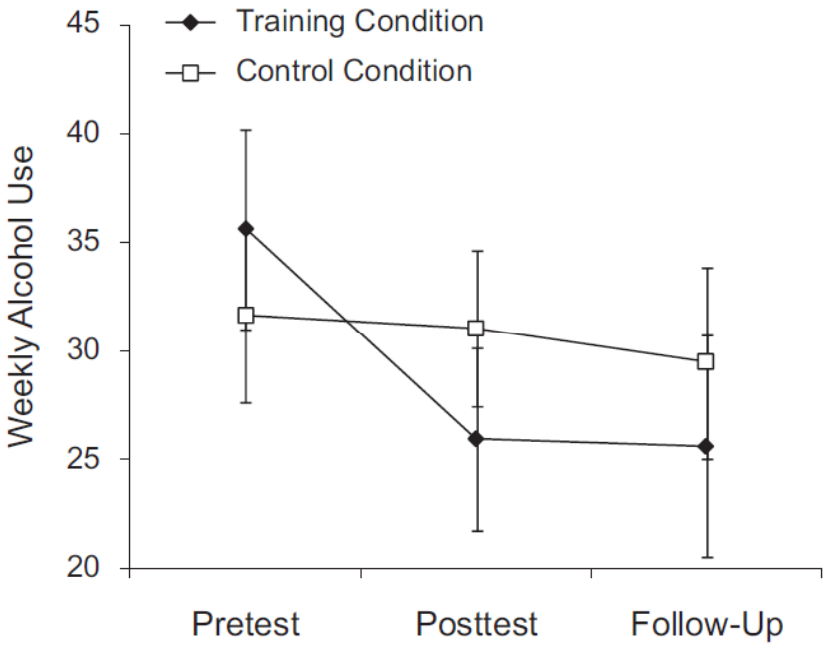


Fig. 3. Estimated marginal means for weekly alcohol use (number of alcoholic drinks per week) at pretest, posttest, and follow-up, separately for participants in the training and control conditions. Error bars represent standard errors of the mean.

- Drinking reduction driven by "automatic " alcohol preference: moderated mediation

Specific Efforts

- Rupp, Kemmler, Kurz, Hinterhuber, Fleischhacker (2012) JSAD, 73, 625-634
  - Treatment Seekers: AUD 6-8 wk inpatient program: Age 27-64, M = 45.3
  - 41 Ss – nondemented, nonamesic
  - Baseline Comprehensive NP battery
  - + Psych measures include Alcohol Craving (OCDS)
  - Two groups, training vs. standard treatment

Specific Efforts

- CR group: 12 sessions (3/week), 45-60 minutes
- Attention, memory, executive function
- Relaxation
- Every 3rd included exercises specific to Ss area of impairment

Specific Efforts (Outcomes)

- T1 to T2: ~40 days
- Treatment Unit: ~50 days
- CR training: ↑ divided attention, working memory
- Recall and alertness, also general cognition and visuo-spatial construction.
- ↓Psychological distress (SCL-90R)
- ↓Compulsive aspect of OCDS



Why Not More?

- Programmatic Commitment
- Skilled Staff
- TIME
- Appropriate Intervention, determined by outcome of interest
  - Completing Treatment ?
  - Sustaining Abstinence ?
    - Refusal Skill Training
    - Mindfulness Training
    - Medication Support

- Enhancing Adaptation, more broadly:
  - Neurocognitive Skill Building
  - Attention/working memory
  - Discrimination learning (emotion)
  - Is there a role for pharmacological cognitive enhancers?
- *Active* interventions as opposed to relying only on the passage of time

Summary

- Compelling literature describing neurobehavioral compromise after detoxification
- Complex picture of the impact of these deficits on treatment outcome and early abstinence
- Paucity of data addressing the impact of deficits on psychosocial adaptation
- Hypothesis-Driven/Systematic Study

Acknowledgements



Lauren Hoffman, M.S., Ben Lewis, Ph.D., Alfredo Sklar, Ph.D., Layla Lincoln, Robert Prather, Ian Frazier, Cole McCarty

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