

# Innovating Promising Cognitive Markers of Preclinical and Prodromal Alzheimer's Disease

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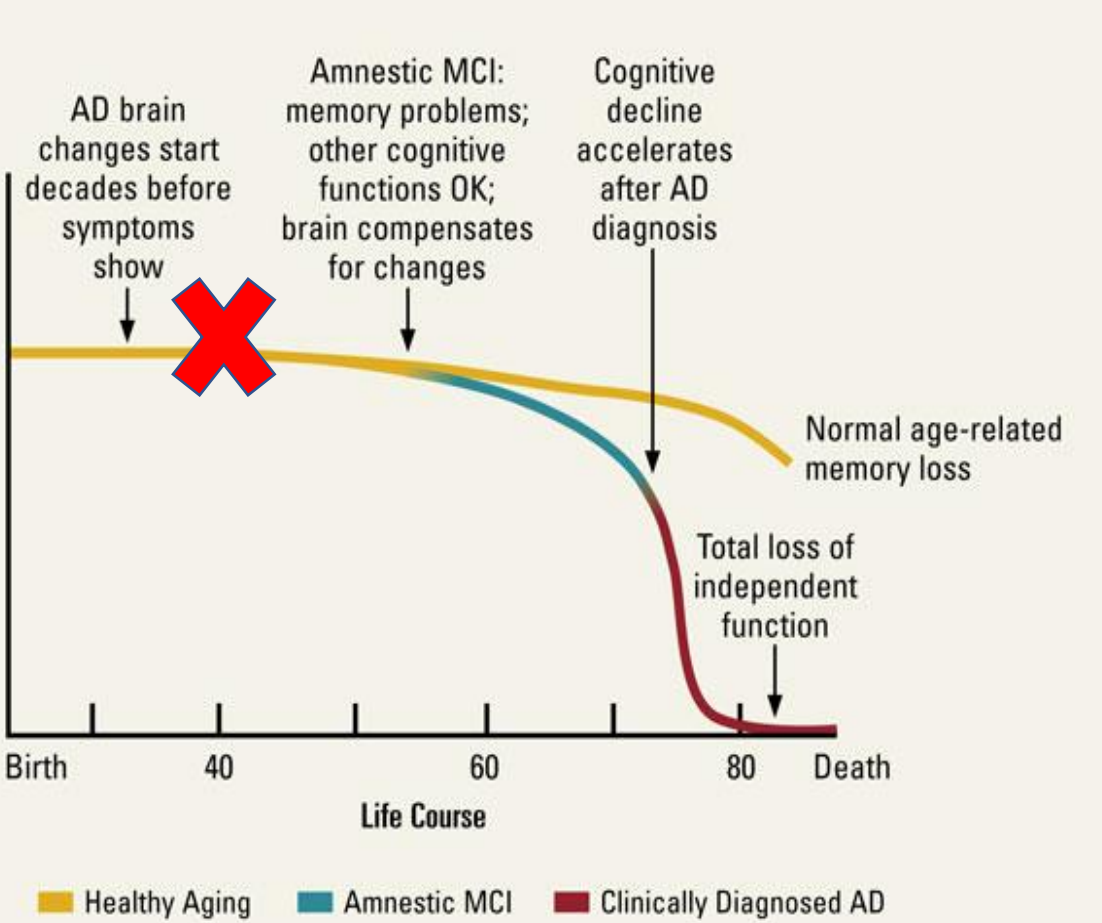
*ISCTM Autumn Conference*  
*Digital Cognitive Tools Panel*

**NO FINANCIAL DISCLOSURES**



# Can we identify a sensitive and specific cognitive marker of preclinical AD?

# frPSI is related to Amyloid Load in Cognitively Normal Elders



	SUVR Total	Anterior Cingulate	Posterior Cingulate	Precuneus	Frontal
LASSI-L Cued 1 (PSI)	rs=-.42*	rs=-.42*	rs=-.41*	rs=-.40	rs=-.31
LASSI-L Cued 2 (frPSI)	rs=-.60**	rs=-.48**	rs=-.50**	rs=-.62**	rs=-.43*
LASSI-L A2 (Maximum Storage)	rs=-.26	rs=-.31	rs=-.19	rs=-.32	rs=-.20
FOME Total Recall	rs=-.16	rs=-.17	rs=-.10	rs=-.16	rs=-.16
NACC Story Delayed Recall	rs=-.29	rs=-.35*	rs=-.08	rs=-.17	rs=-.36*

Note \*p<.05; \*\*p≤.01, survived FDR



FEATURED RESEARCH

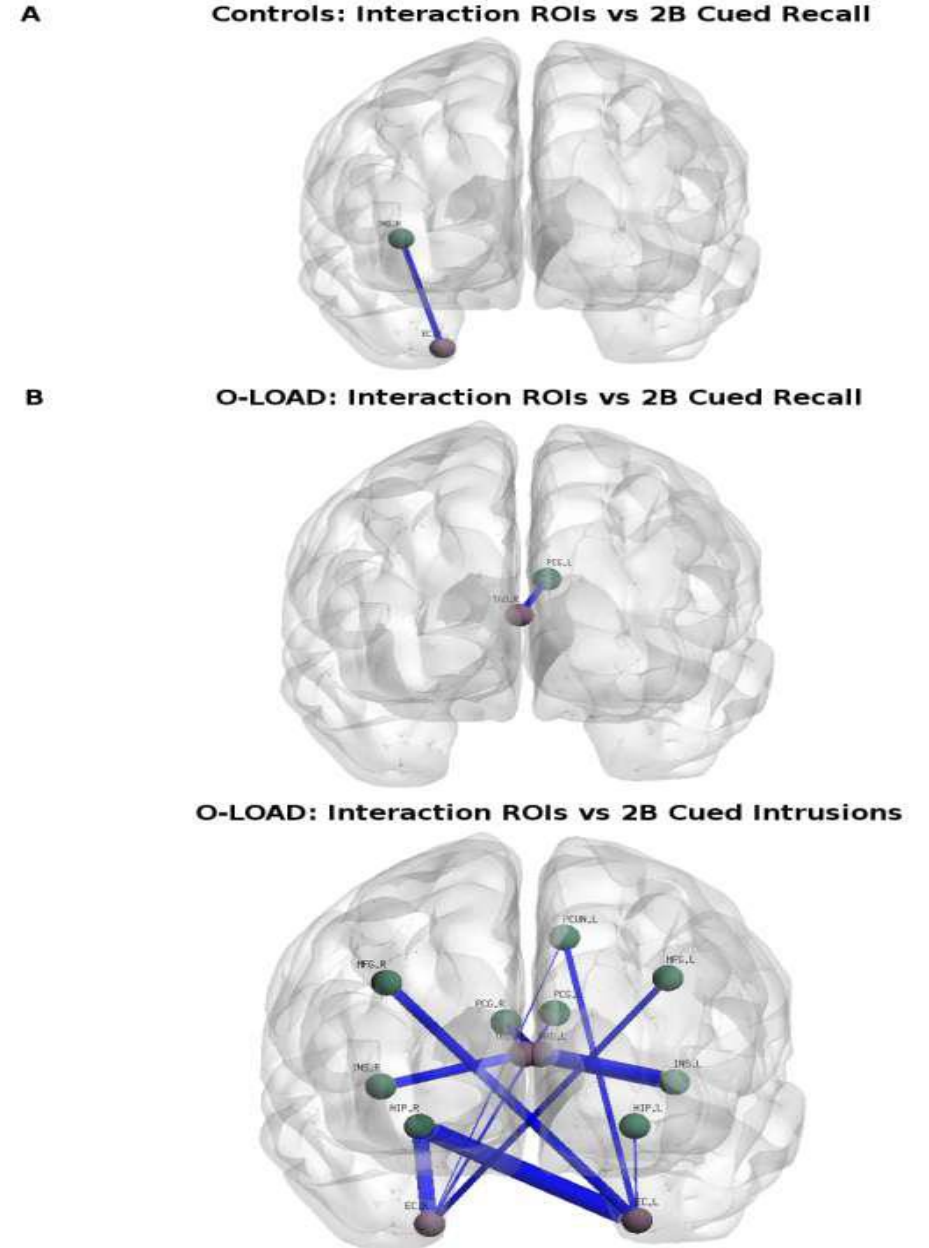
# Cognitive stress test predicts high levels of beta-amyloid

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	MCI-AD (Amyloid+) (n=34)	MCI-SNAP (Amyloid-) (HPC+) (n=29)	MCI-Non-AD (Amyloid-) (n=25)	F-Test or X <sup>2</sup> Test	F-test Adjusting for Age, MMSE and Language
Age	75.44 <sup>a</sup> (SD=8.0)	76.42 <sup>a</sup> (SD=7.5)	70.53 <sup>b</sup> (SD=5.9)	3.49 (p=.036)	NA
HVLT-R Total	16.77 (SD=5.0)	18.00 (SD=3.6)	17.88 (SD=7.3)	.44 (.643)	.09 (p=.917)
Category Fluency	35.97 (SD=9.0)	35.58 (SD=8.6)	34.31 (SD=9.7)	.18 (p=.84)	1.01 (p=.371)
Trails B Time	157.63 (SD=72.8)	172.75 (SD=83.9)	130.00 (SD=75.4)	1.48 (.236)	.35 (p=.707)
LASSI-L B1 Semantic Intrusions	<b>6.50<sup>b</sup></b> <b>(SD=3.2)</b>	<b>3.00<sup>a</sup></b> <b>(SD=2.2)</b>	<b>3.41<sup>a</sup></b> <b>(SD=1.8)</b>	<b>14.52</b> <b>(p&lt;.001)</b>	<b>12.33</b> <b>(p&lt;.001)</b>
LASSI-L B2 Semantic Intrusions	<b>4.78<sup>b</sup></b> <b>(SD=2.5)</b>	<b>2.63<sup>a</sup></b> <b>(SD=2.2)</b>	<b>2.29<sup>a</sup></b> <b>(SD=1.9)</b>	<b>9.13</b> <b>(p&lt;.001)</b>	<b>6.28</b> <b>(p&lt;.001)</b>

# frPSI in Offspring of LOAD

- 21 Middle aged offspring of persons diagnosed with LOAD(O-LOAD); completely clinically asymptomatic
- 20 Middle aged controls
- **Over 50%** of O-LOAD made more than 1 intrusion error (failure to recover from proactive semantic interference)
- **0%** for controls
- Different fMRI Connectivity in Middle-Age O-LOAD



# Development of the LASSI-Brief Computerized Version

- Incorporates effective semantic interference paradigm used to detect preclinical and prodromal AD.
- Automatically administers and scores the test, increasing standardization, accuracy, and real-time data entry
- Available on a web-based platform to increase accessibility
- State-of-the-art Google Voice Recognition technology
- Developed in English and Spanish
- Sponsored by the NIH/NIA 5-year RO1 with longitudinal follow-up comparing its utility to the Cogstate, NIH-toolbox Cognition Battery and ADAS-Cog v13.

# Challenges and Solutions

**VOICE RECOGNITION:** Accuracy of Google VR technology accuracy based on context not single word recognition.  
Example: *the target word "tie" was recognized as "Thai"*

## SOLUTIONS:

- **BUILT A LEXICAL DICTIONARY, USED DATA-DRIVEN NARROWING OF INTRUSION POSSIBILITIES**

**RECORDING OF RESPONSES WITHIN TIME LIMIT:** Human proctor vs. a machine in "transition" to the next trial.

## SOLUTIONS:

- **OBTAIN HUMAN SCORE TO COMPARE TO COMPUTER SCORING DURING VALIDATION PHASES TO OBTAIN DATA AS TO HOW FREQUENT DISCREPANCIES MAY OCCUR AND HOW TO BEST HANDLE**
- **PROS: INCREASES STANDARDIZATION**

**USER INTERFACE:** confusion regarding whether the computer was "listening"

## SOLUTIONS:

- **INCLUDED AN ANIMATED MICROPHONE, MORE VISUAL CUES AND EXPLICIT INSTRUCTIONS FOR HOW TO BEST INTERACT WITH THE DEVICE, INCLUDING A BRIEF TUTORIAL**
- **FURTHER RESTRICTED RANGE OF POSSIBLE SEMANTIC "ERRORS" TO ACCOUNT FOR THIS.**

**CONNECTIVITY:** As a web-based application that uses Google VR "live," administration is dependent upon uninterrupted connectivity.

## SOLUTIONS:

- **VIRTUAL PRIVATE NETWORK TO ENSURE THAT WE CAN OVERCOME ANY LOCAL FIREWALLS, PURCHASED AIR-CARDS TO FACILITATE FIELD WORK, USE BOTH WIRED CONNECTION, AND THE VPN TO IF NEEDED.**