

Neuropsychological Test Performance in Spanish and English Speakers with Normal Cognition and MCI

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DISCLOSURES

- Consultant, Bracket Global

A Global Priority

Early detection of individuals at risk for Alzheimer's disease (AD) is a global priority.



Neuropsychological Assessment Is Essential

1. Cognitive changes are used to **detect** and **track** disease progression over time from MCI to early AD.
2. In addition, a **meaningful change** in cognitive status represents a measurable clinical outcome.
 - FDA will not consider the approval of any emerging AD therapy unless it changes the way a person **“feels, functions or survives.”**
3. Thus, the identification of cognitive measures that are:
 1. Sensitive to detecting early disease states
 2. Useful to track longitudinal change
 3. Converge with biological markers of AD pathology, have become ever more necessary in terms of identifying individuals at risk, monitoring disease progression, and ascertaining treatment efficacy (Edmonds et al, 2015).

Can cognitive stress paradigms
be utilized with Spanish-speaking
Hispanic Older Adults ?

Sample Characteristics of English-Speaking and Spanish-Speaking Elders

	English-Speaking Normals (n=49)	English-Speaking aMCI (n=32)	Spanish-Speaking Normals (n=31)	Spanish-Speaking aMCI (n=27)	F-Value or X ² Value	P-Value
Age	75.74 ^b (SD=8.8)	76.94 ^b (SD=7.0)	70.44 ^a (SD=5.4)	72.63 ^{ab} (SD=7.0)	5.47	.001
Education	15.76 ^b (SD=2.7)	16.53 ^b (SD=2.5)	13.74 ^{ab} (SD=4.0)	13.21 ^a (SD=37)	7.73	<.001
Gender % FEMALE	75.5%	44.1%	87.5%	64.3%	16.07	<.001
MMSE	29.08 (SD=1.2)	27.38 (SD=2.3)	28.19 (SD=2.0)	26.11 (SD=2.6)	14.10	<.001

Note: Means with different alphabetic superscripts are statistically significant at $p < .05$ by Tukey's HSD

LASSI- L Performance Among English-speaking and Spanish-Speaking Cognitively Elderly Normal and Older Adults with Amnesic Mild Cognitive Impairment (aMCI) in the United States

	English-Speaking Normals (n=75)	Spanish-Speaking Normals (n=38)	English-Speaking aMCI (n=32)	Spanish-Speaking aMCI (n=26)	F-Value Adjusted for Age and Edu	P-Value
List A Recall	9.37 ^a (SD=2.3)	8.05 ^{ab} (SD=2.2)	6.78 ^b (SD=2.8)	6.42 (SD=2.4)	12.93	<.001
List A2 Cued Recall (Maximum Storage)	13.17 ^a (SD=1.5)	12.63 ^{ab} (SD=1.5)	11.50 ^b (SD=1.6)	11.08 ^{bc} (SD=2.4)	13.33	<.001
List B1 Cued Recall (Proactive Interference)	7.45 ^a (SD=2.9)	7.03 ^a (SD=2.6)	4.72 ^b (SD=2.5)	6.35 ^a (SD=1.8)	8.64	<.001
List B2 Cued Recall (Deficits in Recovering From Proactive Interference)	11.44 ^a (SD=2.3)	10.82 ^{ab} (SD=2.2)	7.97 ^c (SD=1.9)	9.62 ^{bc} (SD=2.3)	19.77***	<.001
List A3 Cued Recall (Retroactive Interference)	8.48 ^a (SD=2.6)	7.19 ^b (SD=2.3)	6.56 ^b (SD=1.9)	6.39 ^b (SD=2.2)	8.64***	<.001
Delayed Free Recall for Both Target Lists A and B	18.72 ^a (SD=5.3)	17.43 ^{ab} (SD=3.5)	12.47 ^c (SD=4.9)	14.39 ^{bc} (SD=4.8)	14.38***	<.001

Percentage of Hispanic and Non-Hispanic MCI and CN Participants With Deficits on Different LASSI-L Measures

	Hispanic Normal (n=25)	Hispanic MCI (n=37)	Non-Hispanic Normal (n=56)	Non-Hispanic MCI (n=47)	$\chi^2(df=3)$	p-value
A2 Cued (maximum storage) Cut-off ≤ 10	0.0%	29.7 %	5.4%	25.5%	18.06	p<.001
B1 Cued (Susceptible to PSI) Cut-Off ≤ 3	20.0%	24.3 %	12.5%	40.4%	11.15	p<.02
B2 Cued (Failure to Recover from PSI) Cut-off ≤ 7	8.0%	21.6 %	7.1 %	36.2 %	16.39	p<.003
Deficit on Any LASSI-L Test	24.0%	75.7 %	18.5 %	68.1 %	34.69	p<.001

Performance of Hispanic and Non-Hispanic MCI and Cognitively Normal Participants on the LASSI-L Controlling for Age, Gender and Educational Attainment

	Hispanic Normal (n=25)	Hispanic MCI (n=36)	Non-Hispanic Normal (n=53)	Non-Hispanic MCI (n=46)	Main Effect DX Main Effect Ethnicity	DX by Ethnicity Interaction
A2 Cued (maximum storage)	13.04 (SD=1.3)	11.33 (SD=2.0)	13.36 (SD=1.6)	11.54 (SD=1.9)	24.07 *** .79	.26
B1 Cued (Susceptible to PSI)	7.28 (SD=2.6)	6.00 (SD=2.0)	7.47 (SD=2.6)	5.09 (SD=2.4)	12.93 *** 1.75	3.96 *
B2 Cued (Susceptible to failure to Recover from PSI)	10.80 (SD=2.3)	9.25 (SD=2.5)	11.36 (SD=2.3)	8.13 (SD=2.1)	24.98 *** 1.75	8.08 **

Areas Under the ROC Curve For Different LASSI-L Indices Among English-speaking Versus Spanish-speaking Participants with Normal Cognition and aMCI

	aROC English-Speakers	Sensitivity/Specificity	aROC Spanish-Speakers	Sensitivity/Specificity
LASSI-L Free Recall	.770	Cut-Point= 7 61.8%/83.7%	.741	Cut-Point= 7 71.4 %/67.7%
List A2 Cued Recall (Maximum Storage)	.794	Cut-Point= 12 79.6%/69.9%	.748	Cut-Point= 12 71.4%/64.5 %
List B1 Cued Recall (Susceptible to Semantic Proactive Interference)	.776	Cut-Point= 5 67.6%/75.5 %	.621	Cut-Point= 5 42.9 %/64.5 %
List B2 Cued Recall (Susceptible Deficits in Recovering From Proactive Interference)	.871	Cut-Point= 9 79.4%/78.6%	.704	Cut-Point=9 60.7%/83.9%
List A3 Cued Recall (Susceptible to Retroactive Interference)	.709	Cut-Point= 5 67.6%/69.4%	.622	Cut-Point= 6 50.0%/61.3%
Delayed Free Recall for Both Target Lists A and B	.851	Cut-Point= 16 85.3 %/75.5%	.703	Cut-Point= 15 60.7%/71.0 %



Validation of the Spanish Version of the LASSI-L for Diagnosing Mild Cognitive Impairment and Alzheimer's Disease

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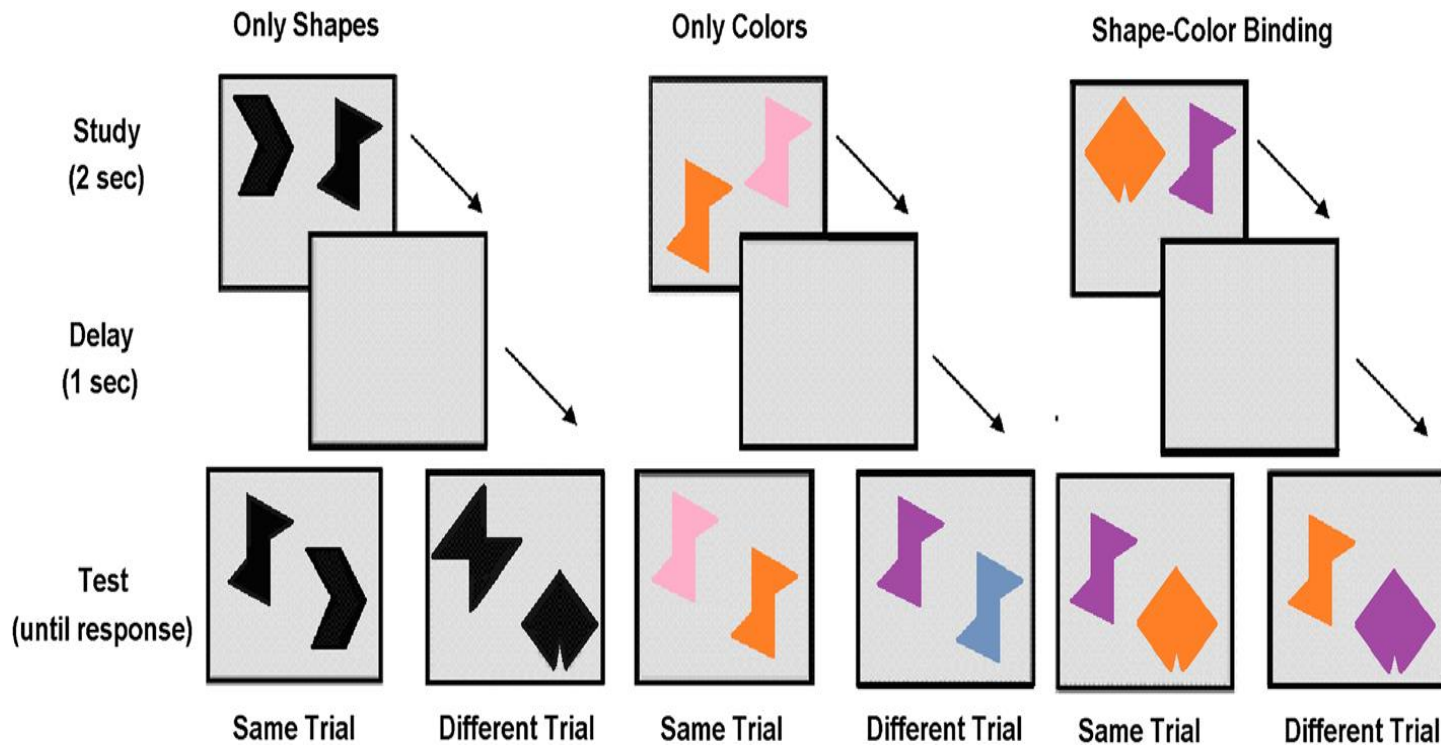
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Table 2
Analysis of variance of the performance among the three diagnostic groups

	Healthy controls (<i>n</i> = 71)	aMCI (<i>n</i> = 33)	AD (<i>n</i> = 32)	F (<i>p</i> -value)
Age	76.23 ± 5.72	77.70 ± 6.52	78.16 ± 6.57	1.34 (0.263)
Gender (number of women, %)	42 (59.2%)	15 (45.4%)	24 (75%)	5.89 (0.052)
Years of education	8.52 ± 4.98 (0–18)	7.61 ± 4.79 (0–18)	7.06 ± 4.20 (0–18)	1.15 (0.320)
MMSE (adjusted)	27.07 ± 1.53 ^{a,b}	25.03 ± 3.28 ^c	20.43 ± 3.94	50.59 (<0.001)
FRA1	6.79 ± 2.19 ^{a,b}	3.97 ± 1.87 ^c	2.50 ± 1.27	61.45 (<0.001)
CRA1	8.11 ± 2.37 ^{a,b}	5.03 ± 2.20 ^c	3.13 ± 2.19	57.74 (<0.001)
CRA2	10.92 ± 2.04 ^{a,b}	7.21 ± 2.38 ^c	4.63 ± 2.37	97.04 (<0.001)
FRB1	5.31 ± 2.29 ^{a,b}	3.21 ± 1.49	2.22 ± 1.09	33.80 (<0.001)
CRB1	5.85 ± 2.50 ^{a,b}	3.76 ± 1.87	2.91 ± 1.59	23.74 (<0.001)
CRB2	9.14 ± 2.46 ^{a,b}	5.42 ± 2.69	4.13 ± 2.10	56.21 (<0.001)
SdFRA	4.49 ± 2.65 ^{a,b}	2.61 ± 2.38 ^c	1.19 ± 1.42	23.43 (<0.001)
SdCRA	6.31 ± 2.16 ^{a,b}	4.09 ± 3.10 ^c	2.16 ± 2.05	34.90 (<0.001)
DR	15.15 ± 3.81 ^{a,b}	5.88 ± 5.29 ^c	2.38 ± 3.58	123.84 (<0.001)

^aHealthy controls versus aMCI – *p*-value <0.05; ^bHealthy controls versus AD – *p*-value <0.05; ^caMCI versus AD – *p*-value <0.05. In gender, chi-square test was performed.

Visual Memory Binding Test



	Hispanic Normals (n=26)	Non-Hispanic Normals (n=28)	Hispanic aMCI (n=27)	Non-Hispanic aMCI (n=22)	F-value
LASSI- Cued A2	13.38 ^b (1.8)	13.86 ^b (1.1)	11.37 ^a (2.1)	10.95 ^a (2.2)	20.89***
LASSI- B1 Cued Recall	7.73 ^b (2.5)	8.04 ^{bc} (2.6)	6.19 ^{ab} (2.1)	5.14 ^a (2.1)	8.43***
LASSI- B2 Cued Recall (Lack of Recovery from pSI)	11.85 ^c (2.0)	11.54 ^c (1.7)	9.56 ^b (2.2)	7.86 ^a (2.1)	20.89***
Visual Memory Binding Test % Shapes	.82 ^{ab} (.12)	.89 ^a (.08)	.74 ^b (.14)	.79 ^b (.12)	7.68***
Visual Memory Binding Test % Color/Shapes	.62 ^b (.10)	.68 ^a (.10)	.58 ^b (.09)	.62 ^{ab} (.11)	5.07 ***



LASSI-L B2 Trial vs. HVLT-R Recall Trial as related to MRI Volumes in Participants with MCI

	LASSI-I B2 Cued Recall Spanish-Speaking MCI (n=25)	LASSI-I B2 Cued Recall English – Speaking MCI (n=40)	HVLT-R Recall Spanish-Speaking MCI (n=25)	HVLT-R Recall English - Speaking MCI (n=40)
Hippocampus	r=.49 **	r=.38 **	r=.08	r=.23
Inferior Lateral Ventricle	r=-.55 **	r=-.39 **	r=-.31	r=-.25
Precuneus	r=.40*	r= .45**	r=.02	r=.14
Supramarginal	r=.28	r= .44**	r=-.05	r=.06
Superior Temporal	r=.22	r= .43**	r=.21	r=.17

Summary

- 1) LASSI-L discriminates aMCI from Cognitively normal ES and SS groups
- 2) LASSI-L Cued B2 recall (lack of recovery from proactive semantic interference) tends to be related to volumes in biologically relevant MRI regions for both ES and SS subjects aMCI subjects.
- 3) ES aMCI subjects seem to have more volume loss in the hippocampus than SS MCI patients
- 4) ES aMCI and ES CN can be readily differentiated by MRI while this is not true for the corresponding SS groups

Novel Cognitive & Functional Assessments

- Miami Prospective Memory Test (Loewenstein and Curiel, University of Miami)
- Miami Test of Semantic Interference and Learning (Loewenstein and Curiel, University of Miami)
- Short Term Visual Memory Binding Test (Mario Parra, University of Edinburg)
- Spatial Navigation Test, Visual Discrimination Test (Rus Bauer, University of Florida)
- Functional Performance Assessment (Czaja, Loewenstein and Harvey, University of Miami)
- Video observation and ecological momentary assessment with smartphone technology

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