

Use of a Performance -based Measure of Functional Competence in MCI: Experience with the UPSA

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Acknowledgments and Disclosures

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- Disclosures
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Performance-Based Measures of Everyday Function in Mild Cognitive Impairment

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Objective: The view that everyday function is preserved in mild cognitive impairment may be problematic. The objectives of this study were to determine the magnitude of impairment in everyday function in patients with mild cognitive impairment and Alzheimer's disease using a novel sensitive performance-based measure (the UCSD Performance-Based Skills Assessment; UPSA), contrast it with use of an informant-based measure (the Alzheimer's Disease Cooperative Study-Activities of Daily Living Inventory; ADCS-ADL), and model the relationship between cognitive measures and the performance-based measure.

Method: Fifty cognitively normal elders, 26 patients who met criteria for amnesic mild cognitive impairment, and 22 patients who suffered from mild to moderate Alzheimer's disease were assessed on the UPSA, the ADCS-ADL, and a battery of neurocognitive tests.

Results: Patients with mild cognitive impairment had significant impairments on

the UPSA but not on the ADCS-ADL. The magnitude of the effect size between the cognitively healthy and the mild cognitive impairment group for the UPSA was large ($d=0.86$). A strong and significant relationship was observed between cognitive performances in speed ($R^2=0.37$), episodic memory ($R^2=0.10$), and semantic processing ($R^2=0.03$) and UPSA score using multiple regression models. The psychometric properties of the UPSA were acceptable, as were its sensitivity and specificity in contrasts between cognitively normal elders and patients with mild cognitive impairment and between the latter group and patients with Alzheimer's disease.

Conclusions: These findings indicate that performance-based measures of function may be a sensitive tool in studies of Alzheimer's disease and mild cognitive impairment and suggest the need for a reconceptualization of the relationship between cognition and function in mild cognitive impairment so that they can be usefully aligned.

(*Am J Psychiatry* Goldberg et al.; AIA:1-9)

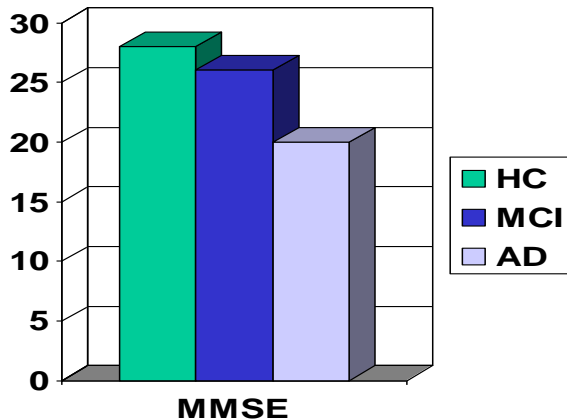
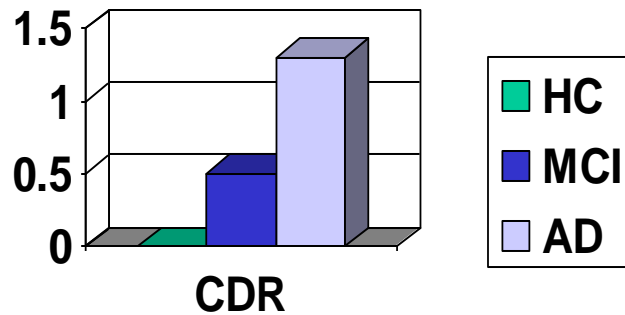
UPSA Subscales

- Communication
- Planning
- Mobility
- Finances

UCSD Performance-based Skills Assessment (UPSA)

- Communication (semantic knowledge, working memory, episodic memory)
- Comprehension and planning (semantic knowledge, executive function, and episodic memory)
- Transportation/mobility (executive function)
- Finance (numerical facility, semantic knowledge)
- Other
 - Short form (Gomar, Bobes, Goldberg, AJGP, in press)
 - European Spanish version for CIBERSAM (Lopez Portilla, Bobes, Gomar, Goldberg)

Staging Measures: Scores

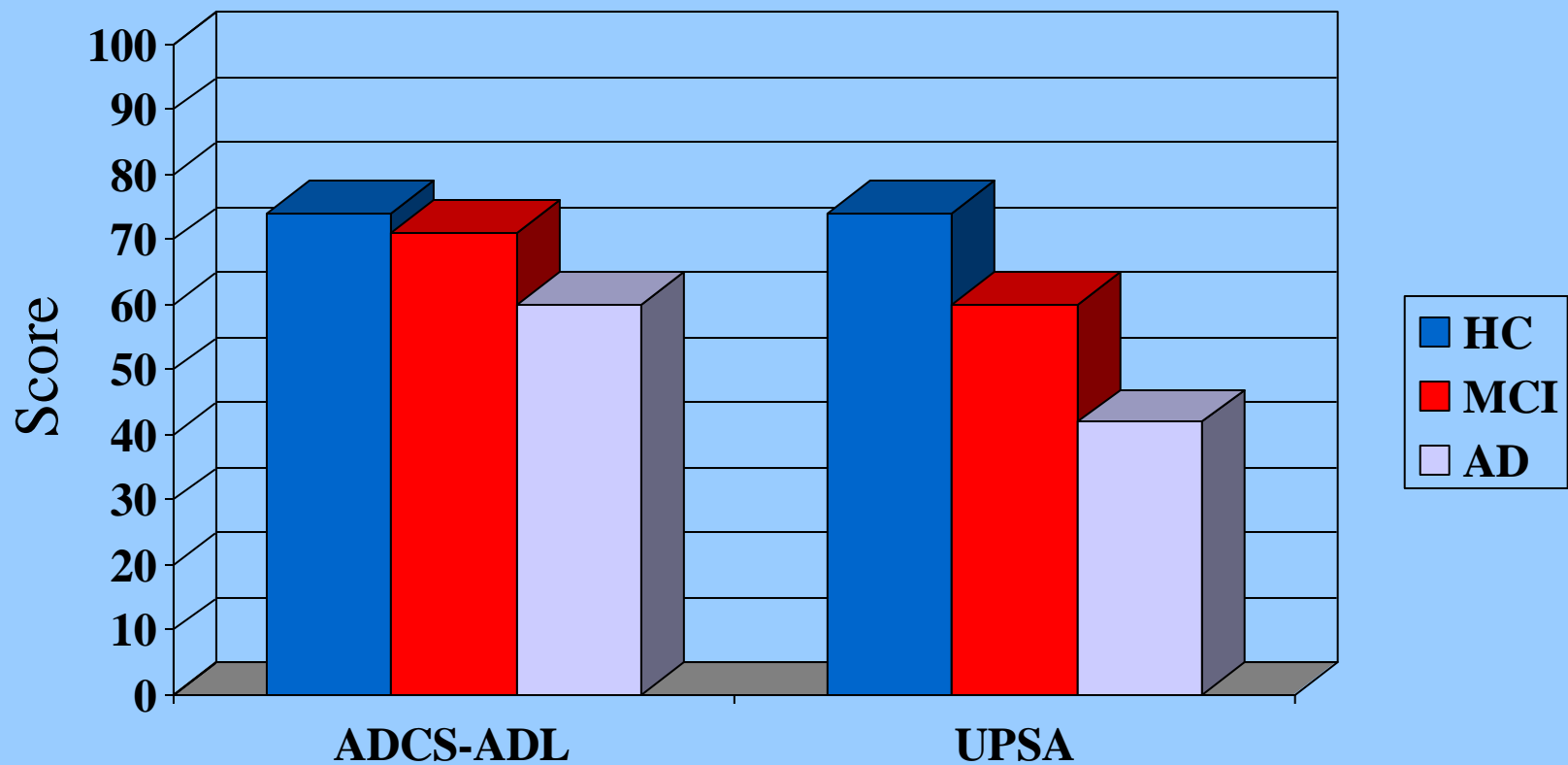


- NB: All MCI Ss had CDRs=0.5
- NB: All MCI Ss had MMSEs>23

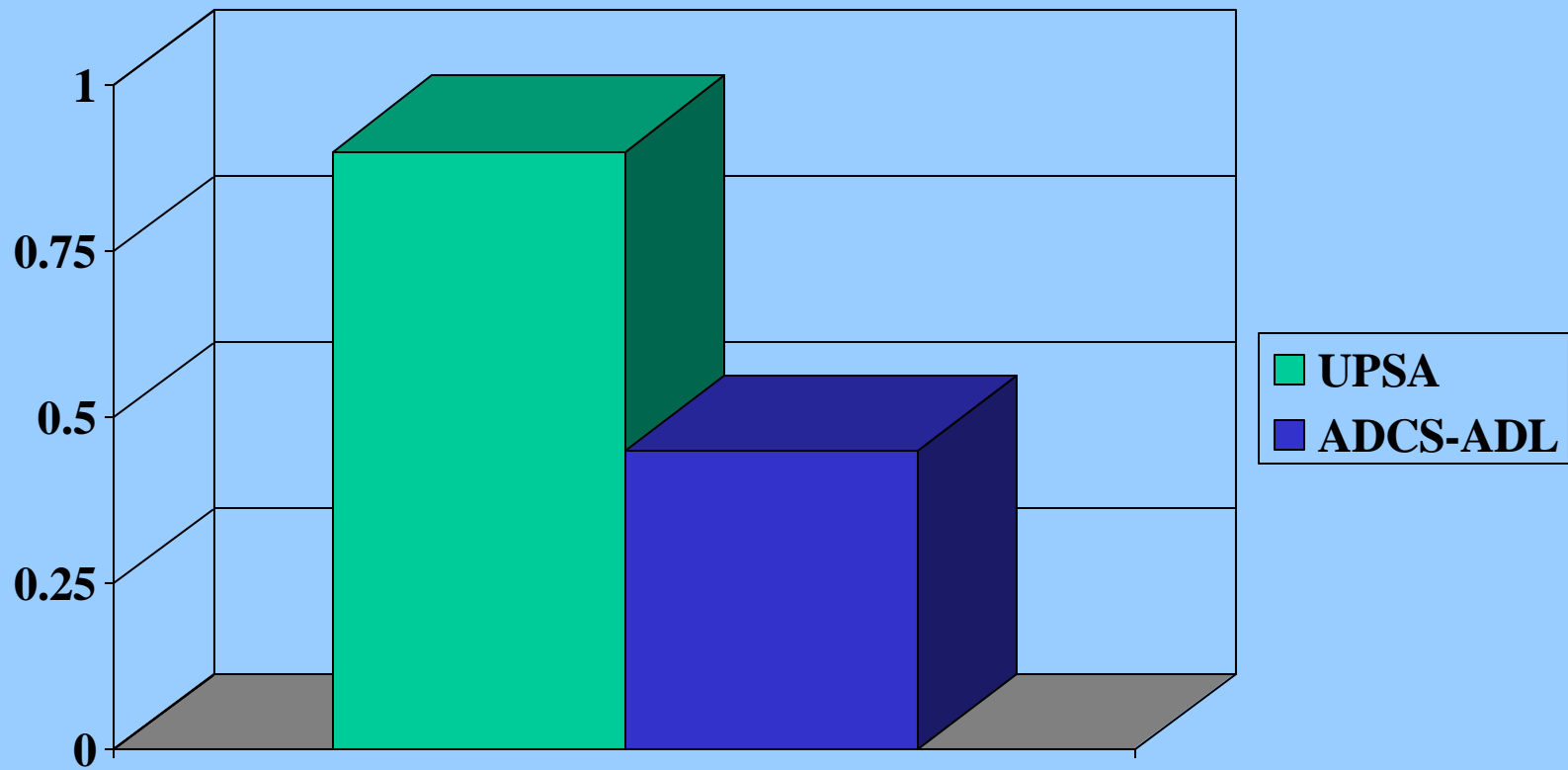
Table 1. Demographics of HC, MCI, and AD Groups

	<u>HC</u> (N=50)	<u>MCI</u> (N=26)	<u>AD</u> (N=22)
<u>Age</u>	67.8 ± 11.3	74.9 ± 8.4	74.7 ± 9.2
<u>Sex (m/f)</u>	14/36	10/16	10/12
<u>Educ.</u>	15.6 ± 3.1	15.0 ± 3.2	12.3 ± 3.6

Performance on Functional Measures



Effect Sizes for UPSA and ADCS in Healthy Control-MCI Contrasts



Scatterplot and Regression Line of ADCS-ADL and UPSA Correlated Values

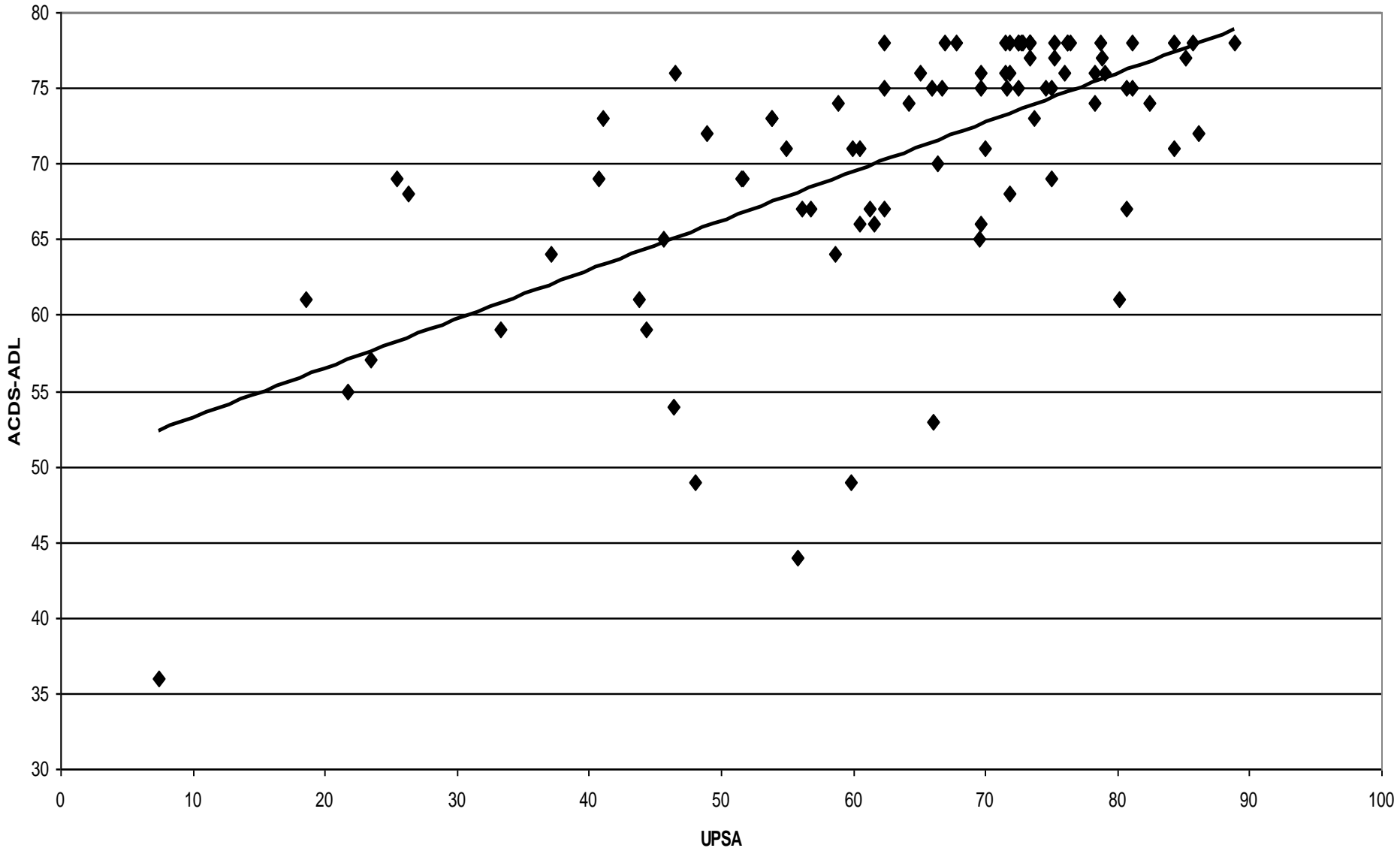


TABLE 3. Psychometric Characteristics of Functional Scales in a Study of the Relationship Between Cognitive and Performance-Based Measures

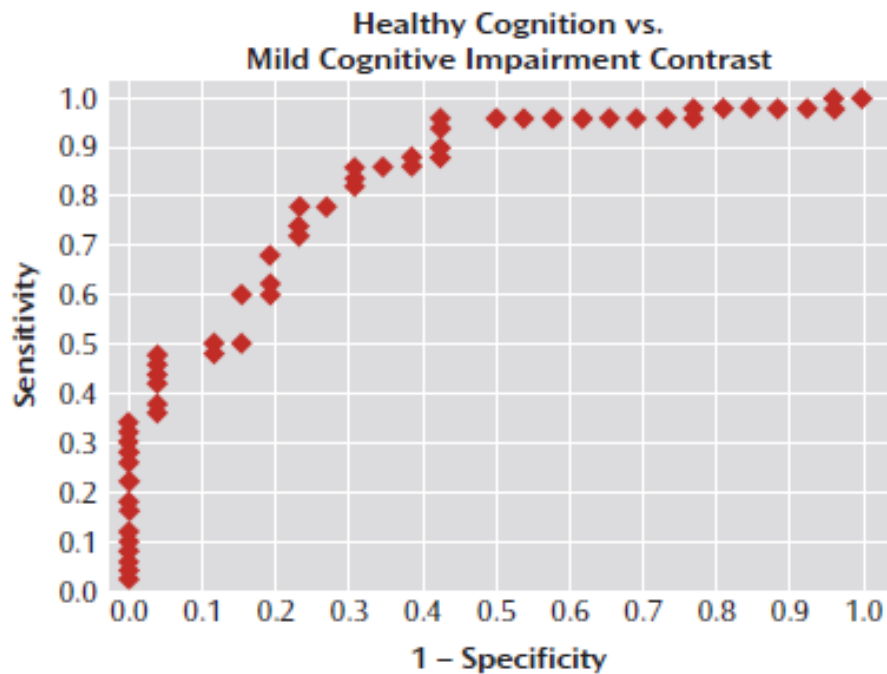
Characteristic	Scale and Group					
	UCSD Performance-Based Skills Assessment			Alzheimer's Disease Cooperative Study- Activities of Daily Living Inventory		
	Cognitively Normal	Mild Cognitive Impairment	Alzheimer's Disease	Cognitively Normal	Mild Cognitive Impairment	Alzheimer's Disease
Skew	0.40	-0.29	-0.23	-3.52	0.16	-0.89
Kurtosis	1.85	-0.30	-0.80	14.09	-0.70	0.51
Coefficient of variation	11.86	14.85	40.72	6.24	5.42	16.57
Shapiro-Wilk normality test	0.97	0.98	0.96	0.55***	0.96	0.94

***p<0.001.

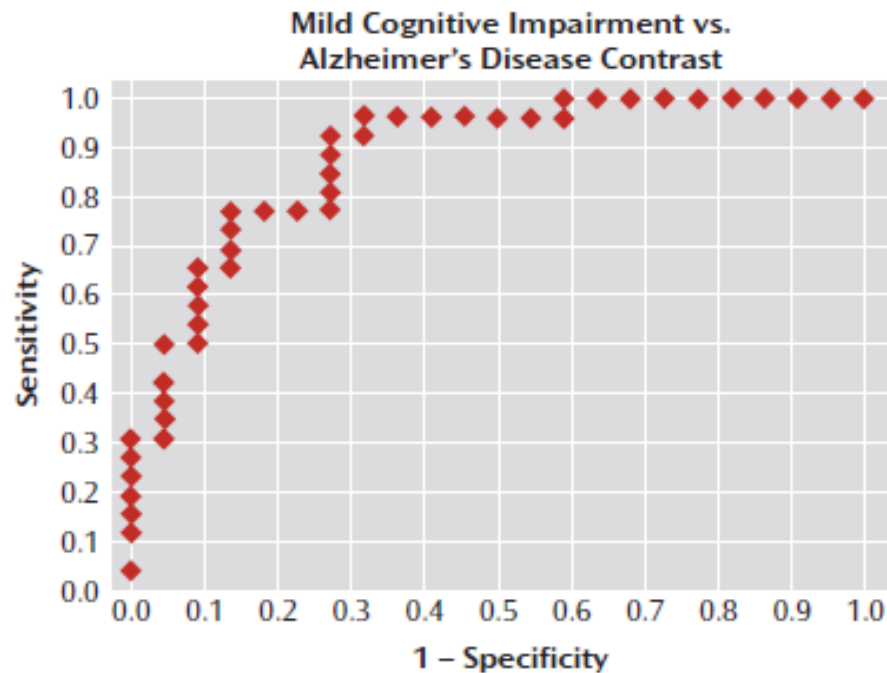
HC v. MCI

AUC=.84, sensitivity=.88, specificity=.58

FIGURE 1. Receiver-Operating-Characteristic Curves of the UCSD Performance-Based Skills Assessment for the Contrast Between the Cognitively Healthy and Mild Cognitive Impairment Groups and the Mild Cognitive Impairment and Alzheimer's Disease Groups^a

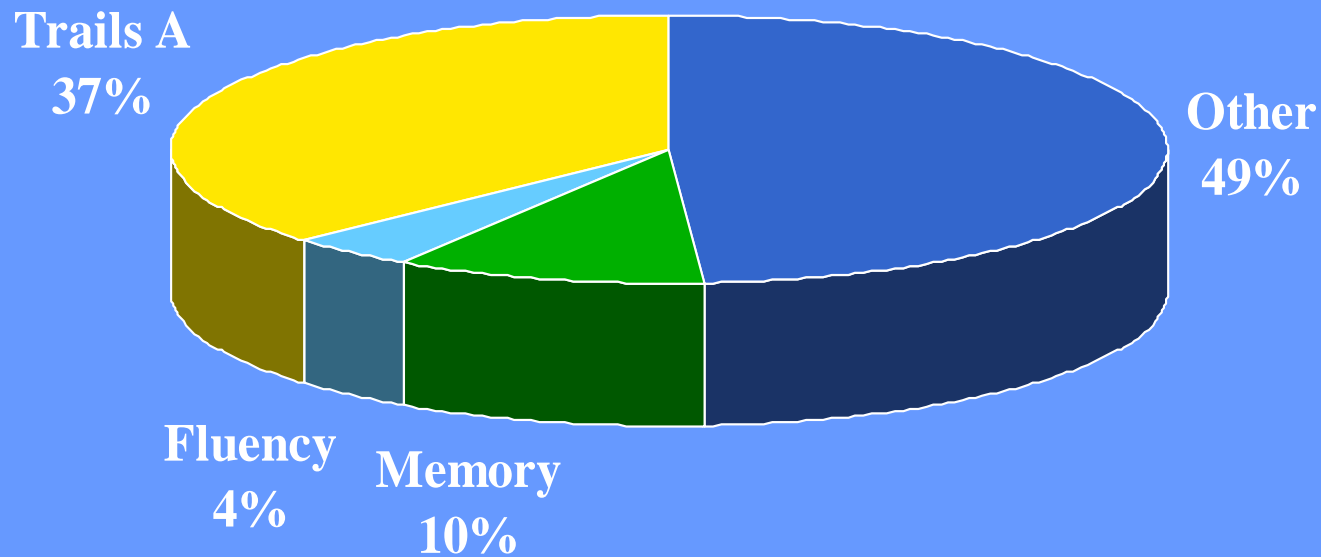


MCI v. AD/ AUC=.88

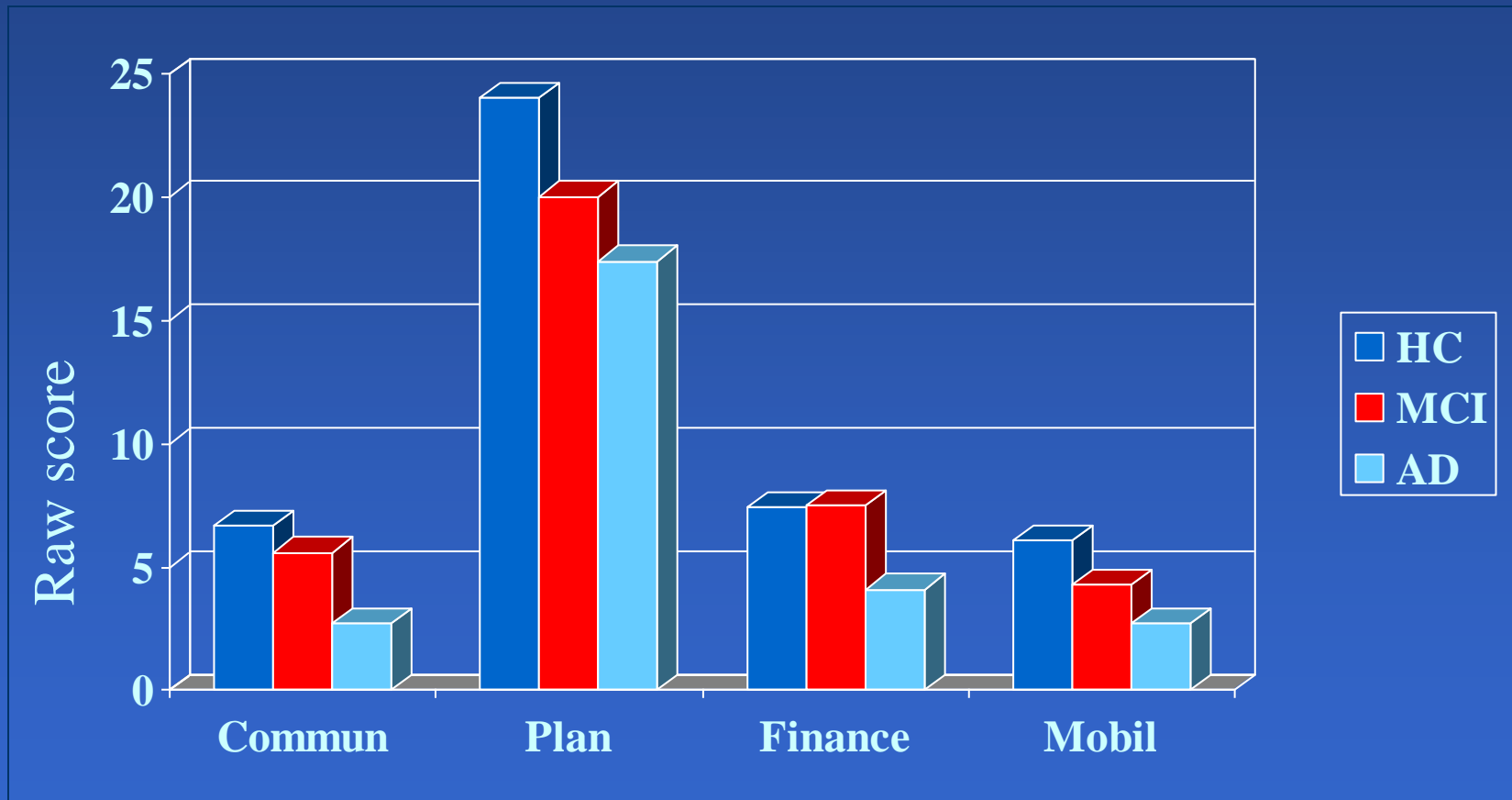


^a Area under the curve, a general marker of sensitivity and specificity, was acceptable in both contrasts (>0.80). Note that the “elbow” for both contrasts is in the upper left corner of the panels, consistent with this interpretation.

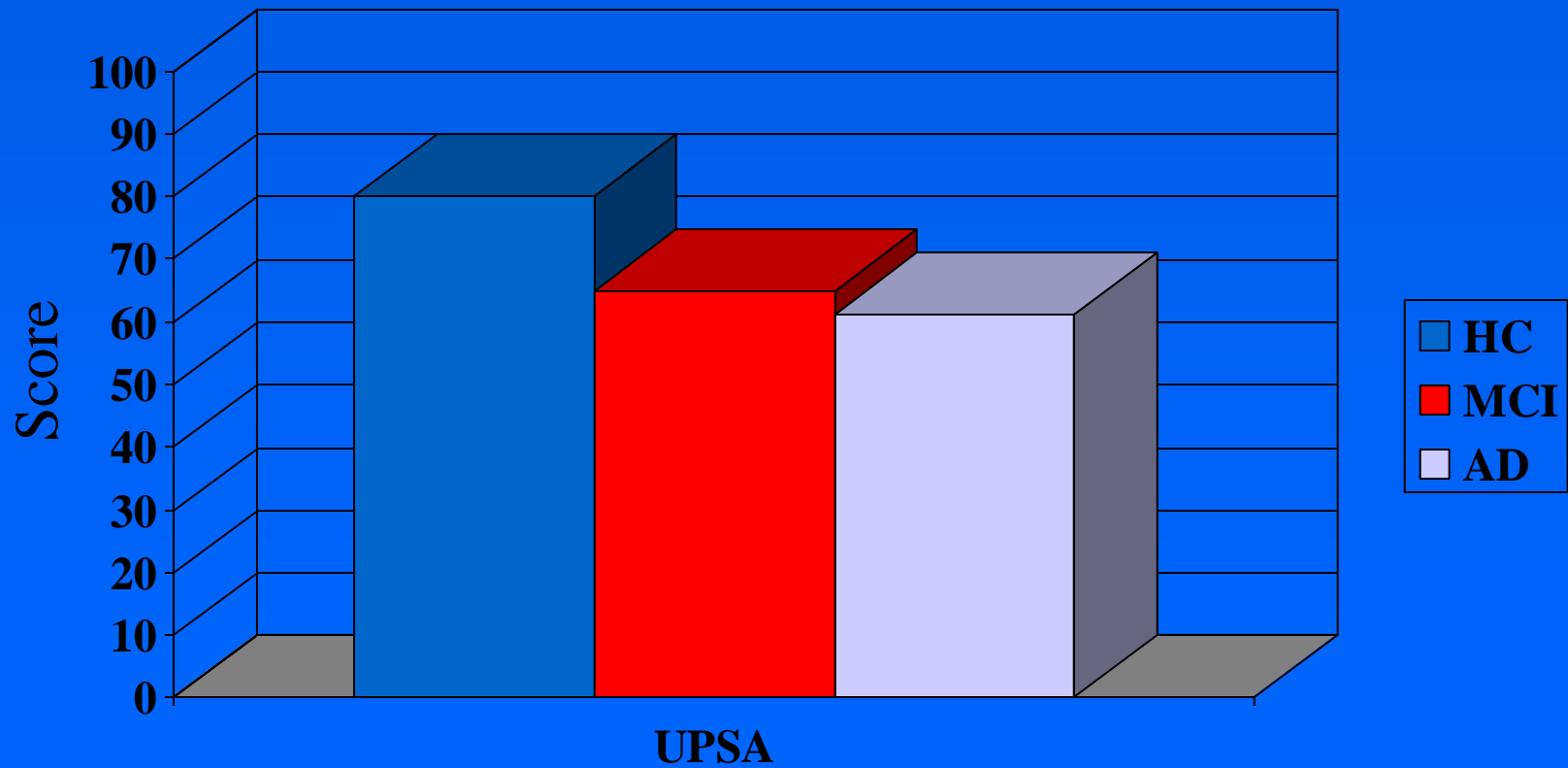
Variance in UPSA Functional Status Accounted For by Speed of Processing, Episodic Memory, and Semantic Memory



UPSA Scores (Goldberg et al)



Performance on UPSA Short Form



UPSA Short Form for MCI/AD

TABLE 2. Regression Model After Stepwise Procedure (Without Forcing Age and Education in the Model) in All Subjects

	Partial R^2	$F_{[4,84]}$	p
Intercept		0.19	0.66
Communication	0.78	306.14	<0.0001
Comprehension/planning	0.11	91.33	<0.0001
Mobility	0.04	42.03	<0.0001

Note. The UPSA long-form total score served as the dependent variable.

Motivations for a Semantic Processing Study

- Early molecular changes and volumetric reductions in lateral temporal cortex
- Functional compromises in MCI (in which not all the variance is explained by speed or episodic memory)
- Limitations of semantic processing tasks utilized in prior studies (e.g., overt retrieval)
- Clinical observations of perplexity in individuals with MCI

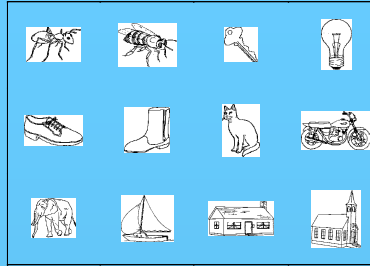
WORDS (in size order)



PICTURES (in size order)



Ant	Bee	Key	Lightbulb
Shoe	Boot	Cat	Motorcycle
Elephant	Sailboat	House	Church



CONDITION 1

Stimuli were two words of equivalent fonts

ANT

HOUSE

ANT

KEY

Question: Is the word on the bottom larger or smaller in the real world than the word on the top?

Question: Is the picture on the bottom larger or smaller in the real world than the picture on the top?

CONDITIONS 2 and 3

Stimuli were two images depicted in different sizes

Either...



Congruent Condition

Or...



Incongruent Condition

Question: Is the picture on the bottom larger or smaller in the real world than the picture on the top?

Final Thoughts (i)

Other performance based measures

- Giovanetti (time)
- Cullen (not applied to MCI)
- Schmitter-Edgecombe (scoring)

New Initiatives

- Longitudinal Study (including test-retest reliability) in early and late MCI (DoD funded)

Final Thoughts (ii)

- UPSA known to be sensitive to different degrees of impairment (in MCI/AD)
- Unknowns
 - Longitudinal decline (TG/DoD study ongoing)
 - Treatment sensitivity
 - Practice effect
- Will a performance based measure separate tx and pbo groups in “preclinical AD” in a long longitudinal study because it is not subject to ceiling effects, is more precise in measurement, etc.?
- Unproven assumption: tests sensitive to decline will be sensitive to treatment related improvement

UPSA Results

- Magnitude of impairments in everyday function is large in MCI
- Performance based measure is advantaged
- Functional and cognitive domains are systematically related

