Neuropsychological impairment in patients with MCI and PD$_{MCI}$
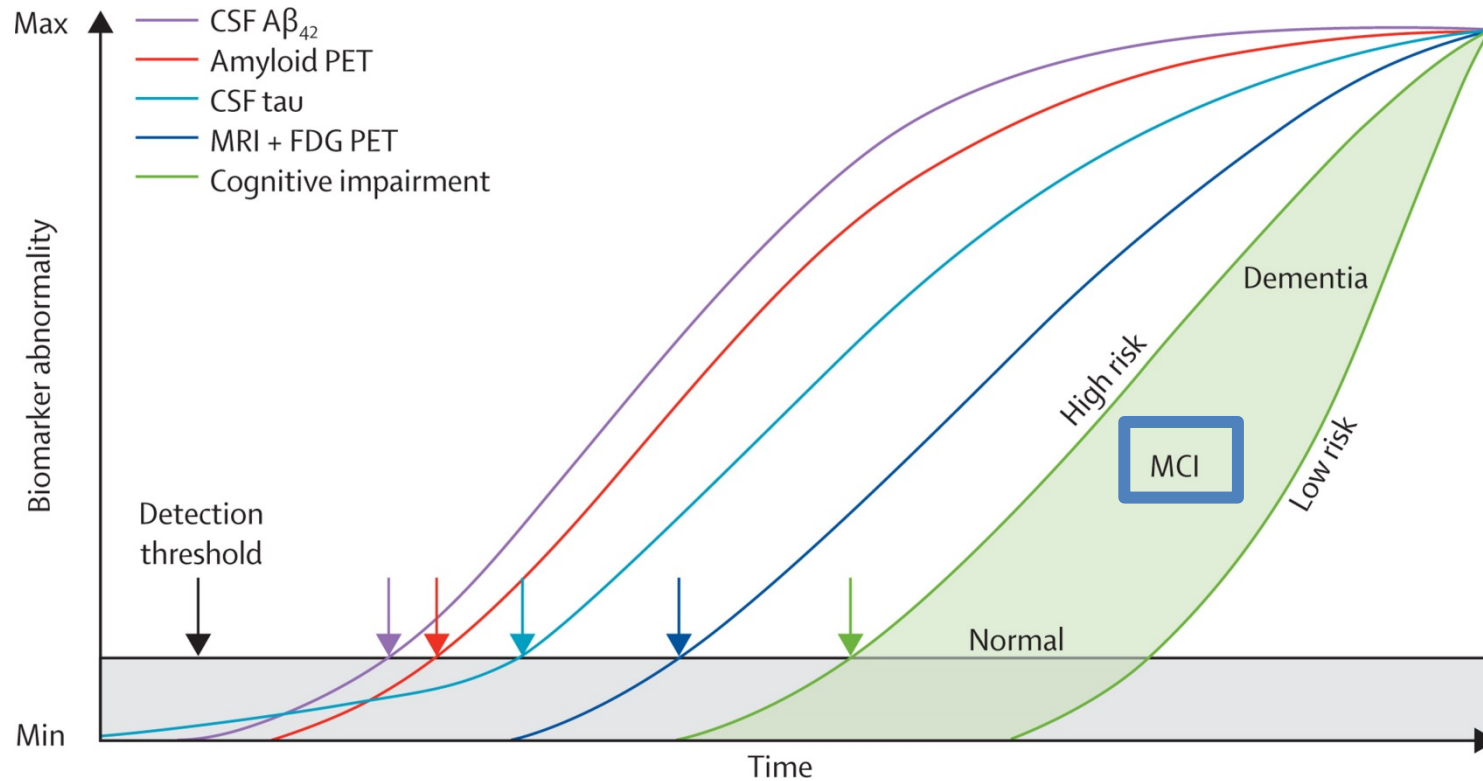
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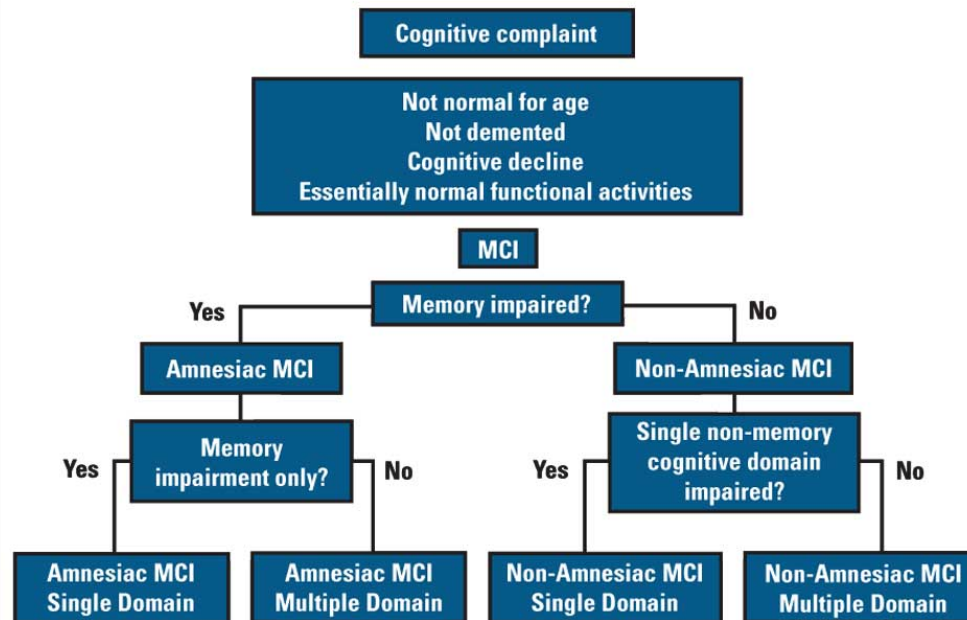University Medical Centre Ljubljana

Jack et al., 2013

Mild cognitive impairment (MCI)

- an intermediate stage between the expected cognitive decline of normal aging and the dementia

- increased risk of later progressing to dementia

- impaired cognitive functioning but preserved everyday functioning

- MCI → Dementia (10 % - 15 % per year)

Grundman et al., 2004

Subtypes of MCI

FIGURE 1.

Current diagnostic algorithm for diagnosing and subtyping MCI

Cognitive complaint

Not normal for age
Not demented
Cognitive decline
Essentially normal functional activities

MCI

Memory impaired?   Yes / No

Amnesiac MCI   Non-Amnesiac MCI

Memory impairment only?   Yes / No

Single non-memory cognitive domain impaired?   Yes / No

Amnesiac MCI Single Domain   Amnesiac MCI Multiple Domain   Non-Amnesiac MCI Single Domain   Non-Amnesiac MCI Multiple Domain

MCI=mild cognitive impairment.

Petersen R, Negash S. *CNS Spectr*. Vol 13, No 1. 2008.

MCI in Parkinson's disease

- MCI common in non-demented PD patients, occuring in about 20 – 50 %

- PD-MCI patients exhibit nonamnestic deficits in cognitive domains such as executive function, attention, and visouspatial function

- recent studies: the cognitive phenotype of PD-MCI is heterogeneous with some patients demonstrating greater amnestic deficits

Goldman and Litvan, 2011

Motivation for our study

- better understanding of early cognitive changes in MCI and PD patients

- contrast differences in cognitive processing between different neurological diseases

- potential mechanisms of these changes by means of different research tools

- to follow our subjects and to assess predictive power of combined methods (biomarkers)

Sample information

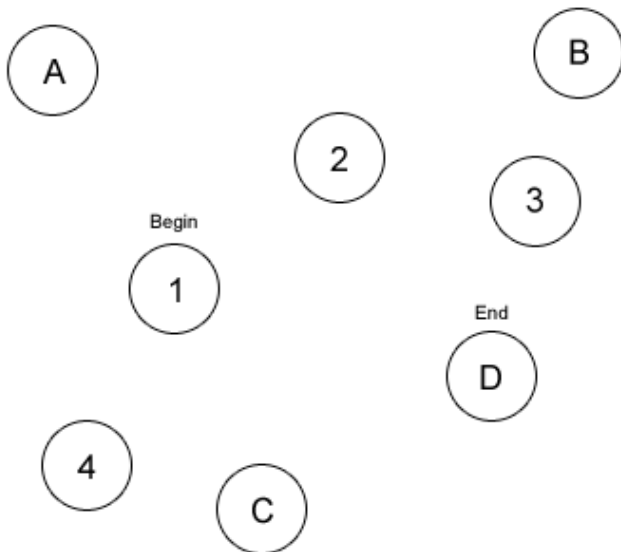|	Control	MCI	PD$_{MCI}$	PD
N	20	20	15	16
Age (yr)	66,72 (7,82)	69,4 (7,1)	68,33 (6,2)	66,25 (5,85)
Eduaction (yr)*	14,50 (2,81)	11,6 (2,96)	12 (2,93)	14,80 (2,44)

$F = 4{,}930; p = 0{,}004$

Neropsychological tests

Digit span

4 1 5 9 – 4 1 5 9
1 9 0 5 – 5 0 9 1

Verbal learning test

REY AUDITORY VERBAL LEARNING TEST (RAVLT) *Phase I*

Patient: _____

Age: _____

LIST A	1	2	3	4	5	LIST B	1	LIST A	6	7
DRUM						DESK		DRUM		
CURTAIN						RANGER		CURTAIN		
BELL						BIRD		BELL		
COFFEE						SHOE		COFFEE		
SCHOOL						STOVE		SCHOOL		
PARENT						MOUNTAIN		PARENT		
MOON						GLASSES		MOON		
GARDEN						TOWEL		GARDEN		
HAT						CLOUD		HAT		
FARMER						BOAT		FARMER		
NOSE						LAMB		NOSE		
TURKEY						GUN		TURKEY		
COLOR						PENCIL		COLOR		
HOUSE						CHURCH		HOUSE		
RIVER						FISH		RIVER		
SCORE										

Stroop test

BLUE GREEN YELLOW
PINK RED ORANGE
GREY BLACK PURPLE
TAN WHITE BROWN

Trail Making Test

A B 2 3 1 Begin End D 4 C
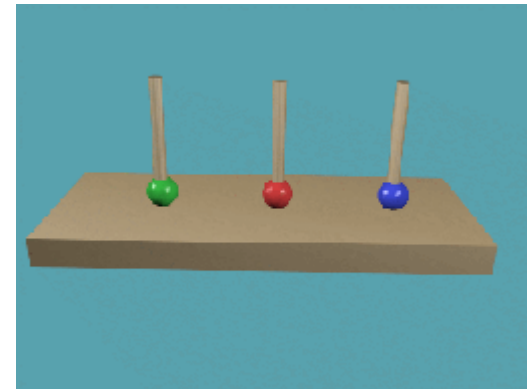
Verbal fluency

cat silver car
zebra sweet salad
cow soft truck
mouse sleep spinach
elephant scissors motor
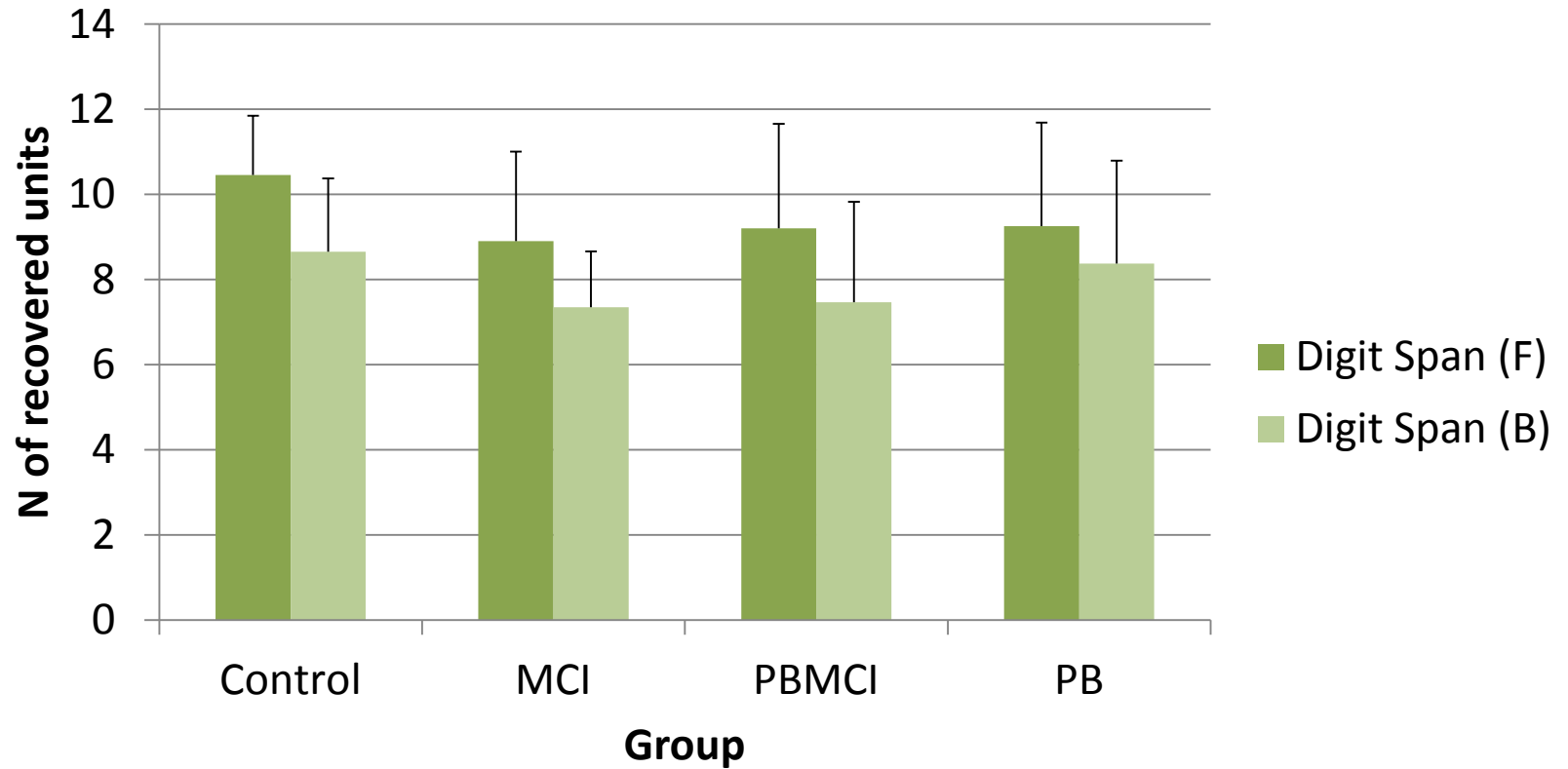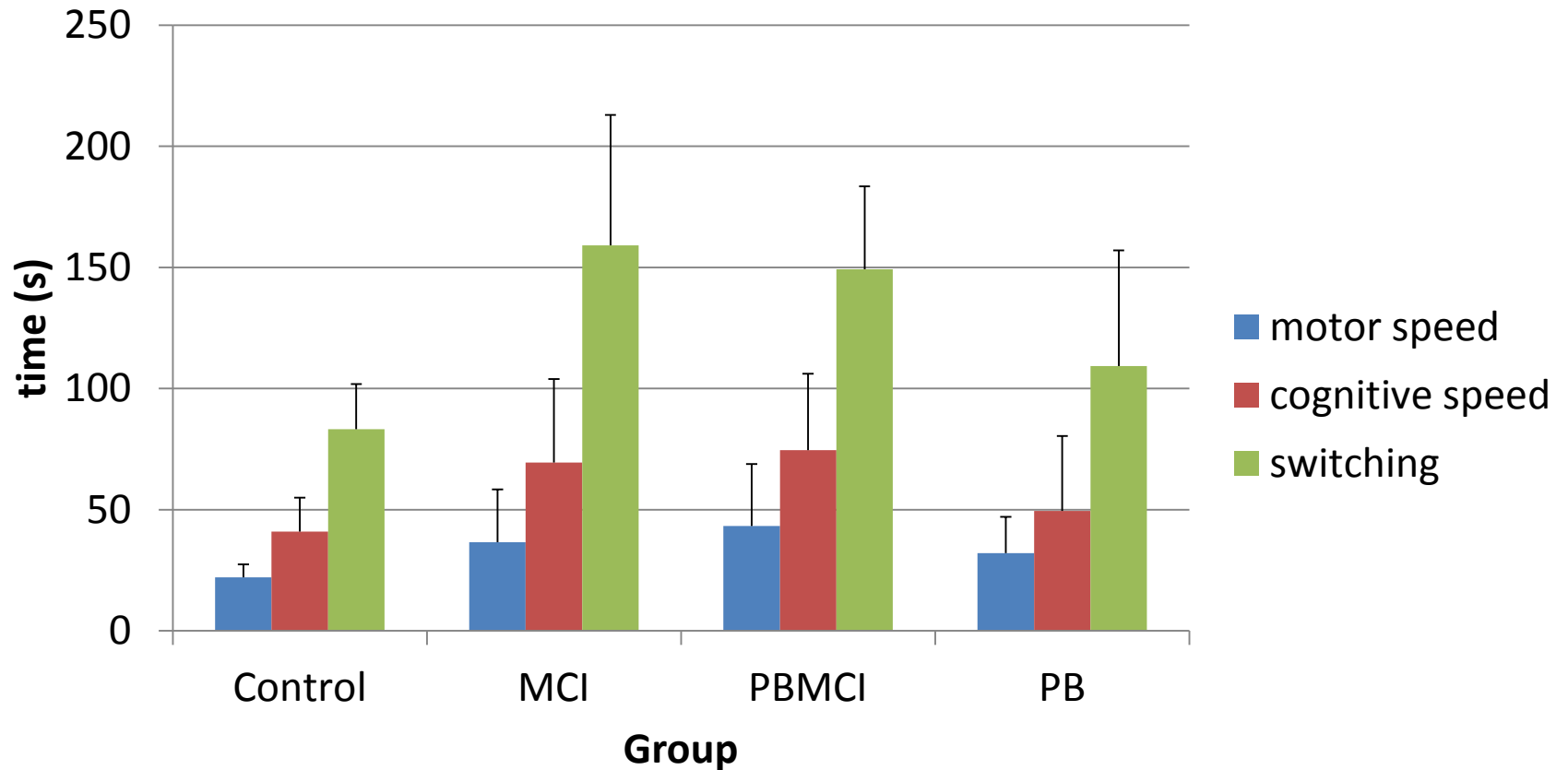lion silence onion
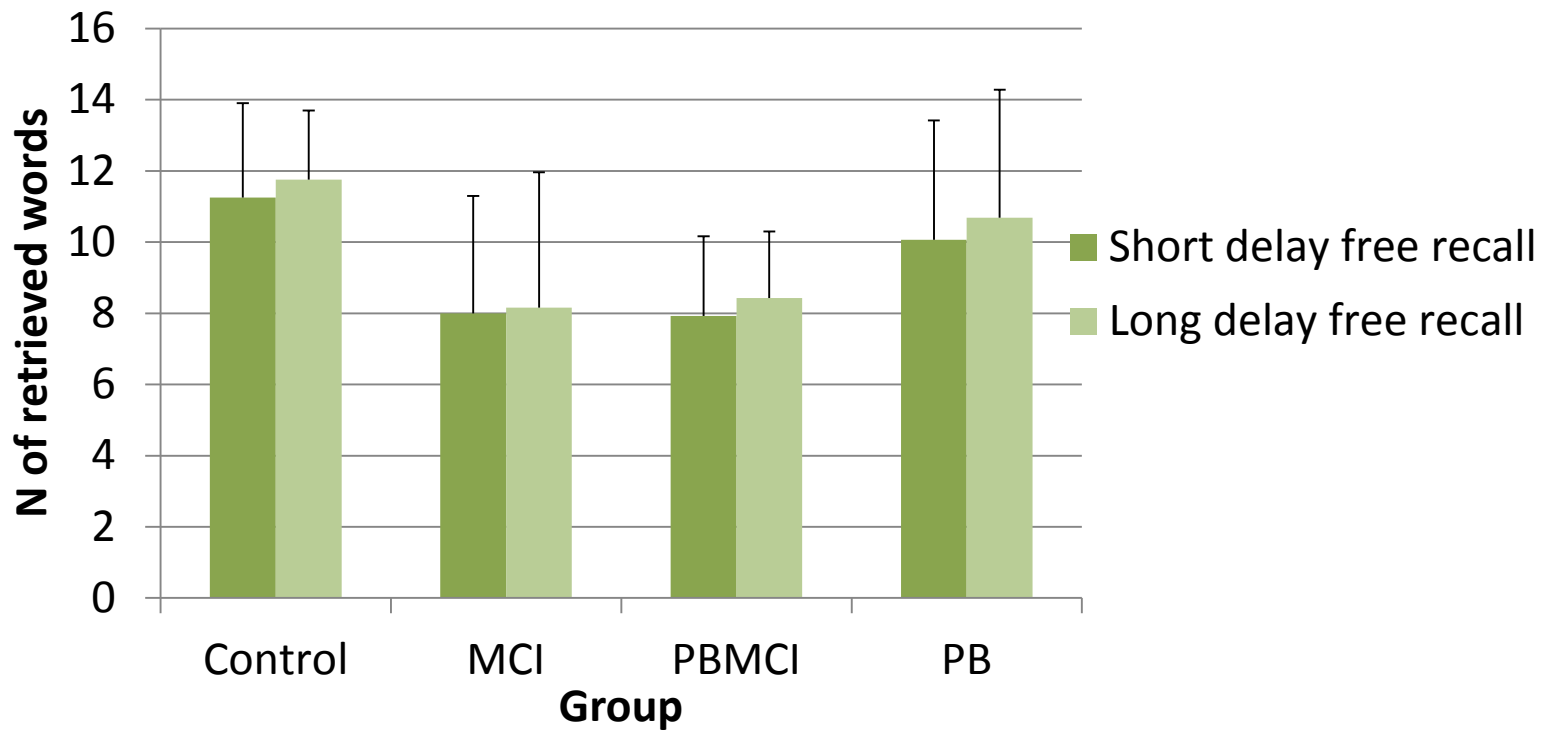
Visual memory test
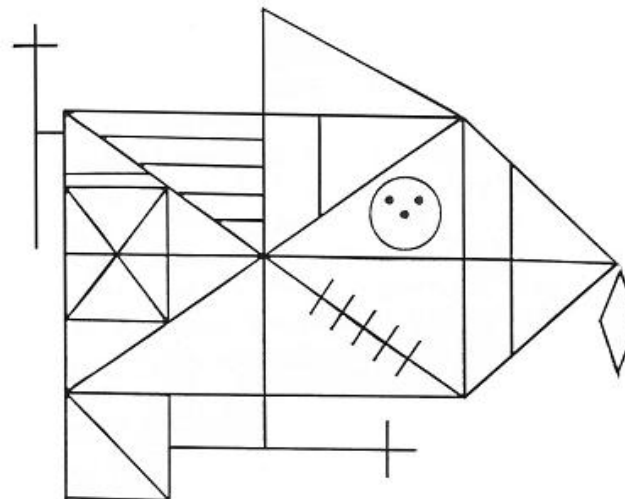
Tower test

Attention span

digit span forward: $F = 2{,}093$; $p = 0{,}109$
digit span backward: $F = 2{,}049$; $p = 0{,}115$

Speed of mental processing

cognitive speed: F = 5,171; p = 0,003
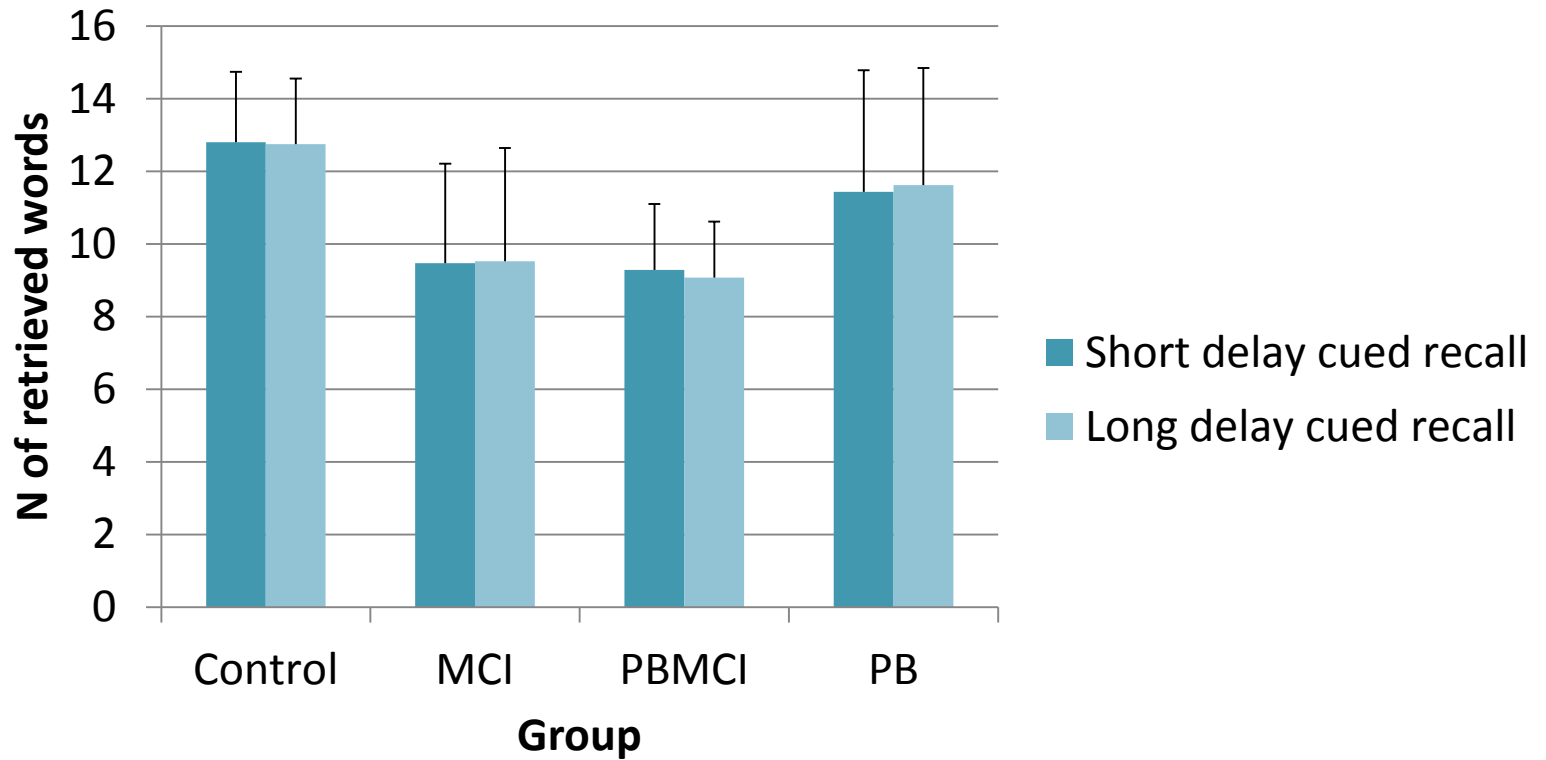*switching: F = 12,570; p = 0,000*
motor speed: F = 3,966; p = 0,012

Verbal memory test (free recall)

short: F = 5,498; p = 0,002
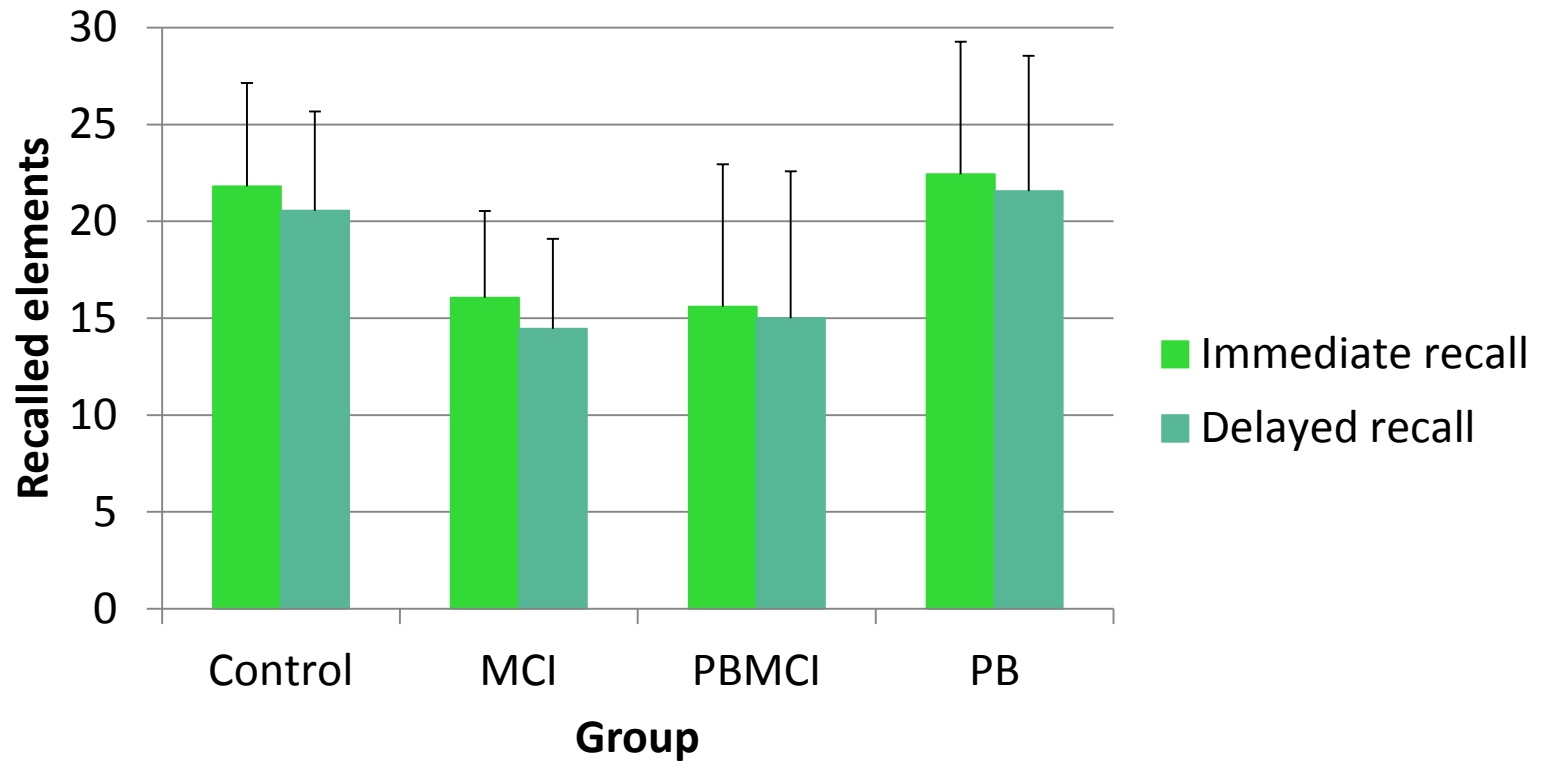*long: F = 6,301; p = 0,001*

Verbal memory test (cued recall)
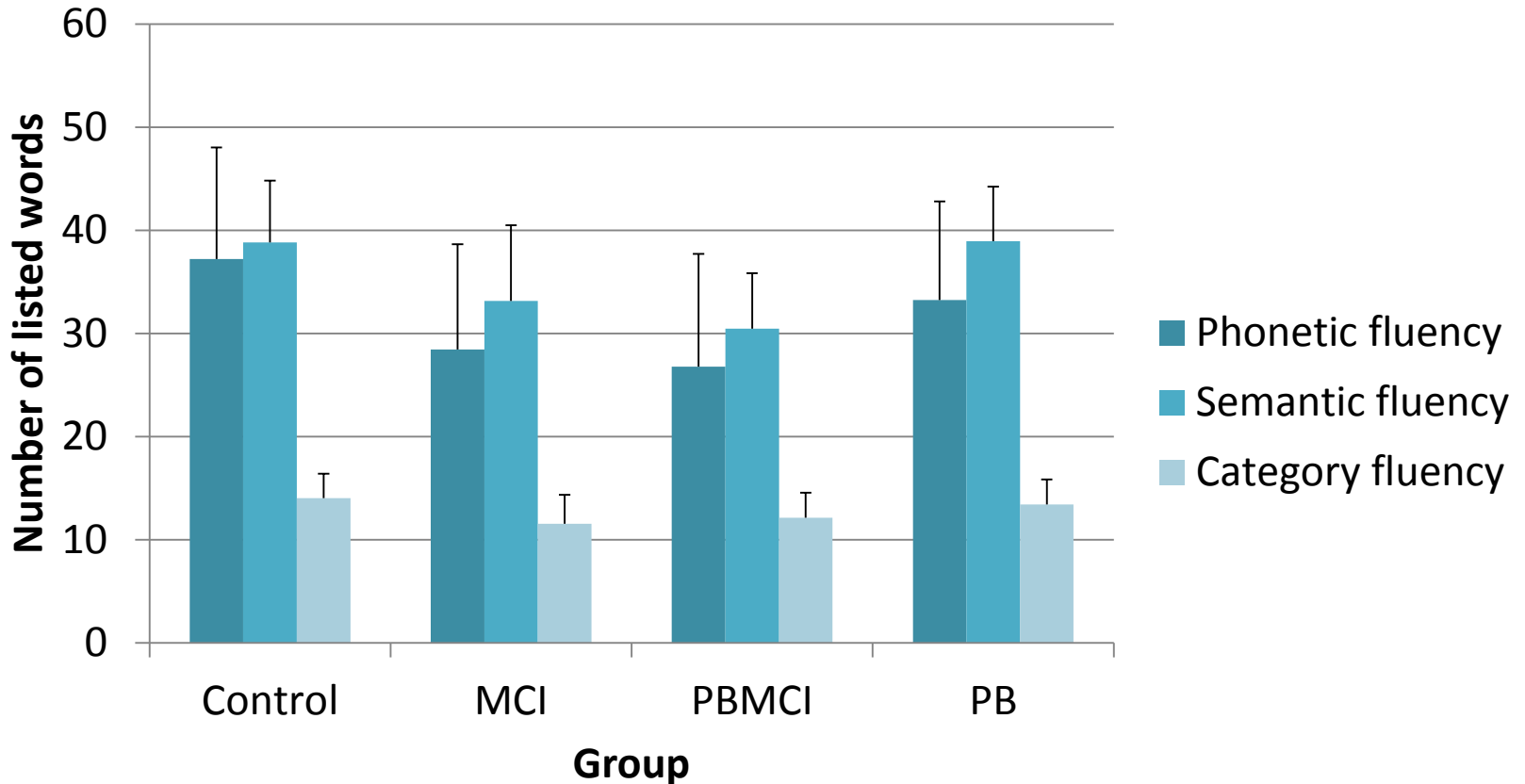
short: F = 7,893; p = 0,000
long: F = 8,161; p = 0,000
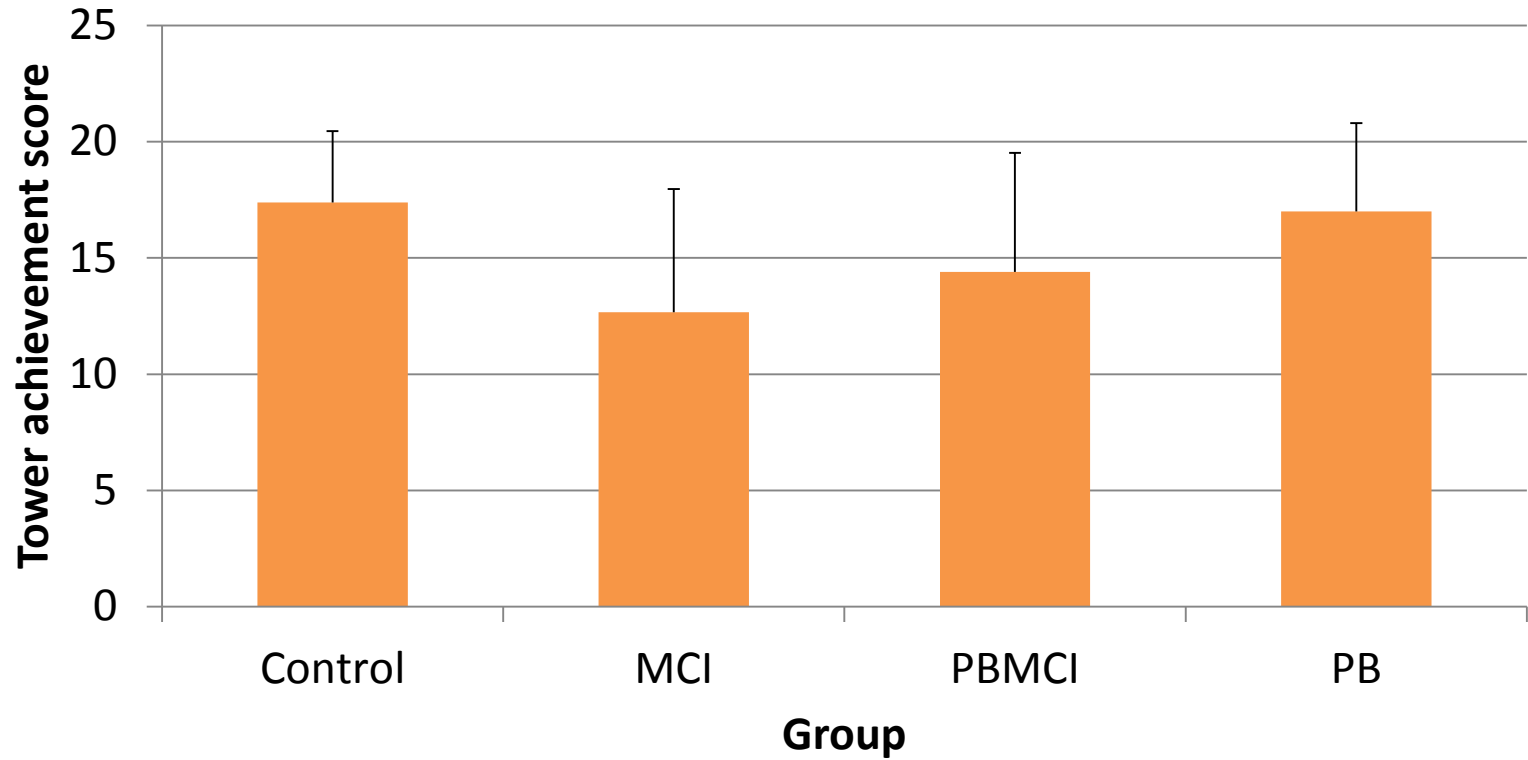
Visual memory

short: F = 6,667; *p* = 0,001
long: F = 6,670; *p* = 0,001

Verbal fluency performance
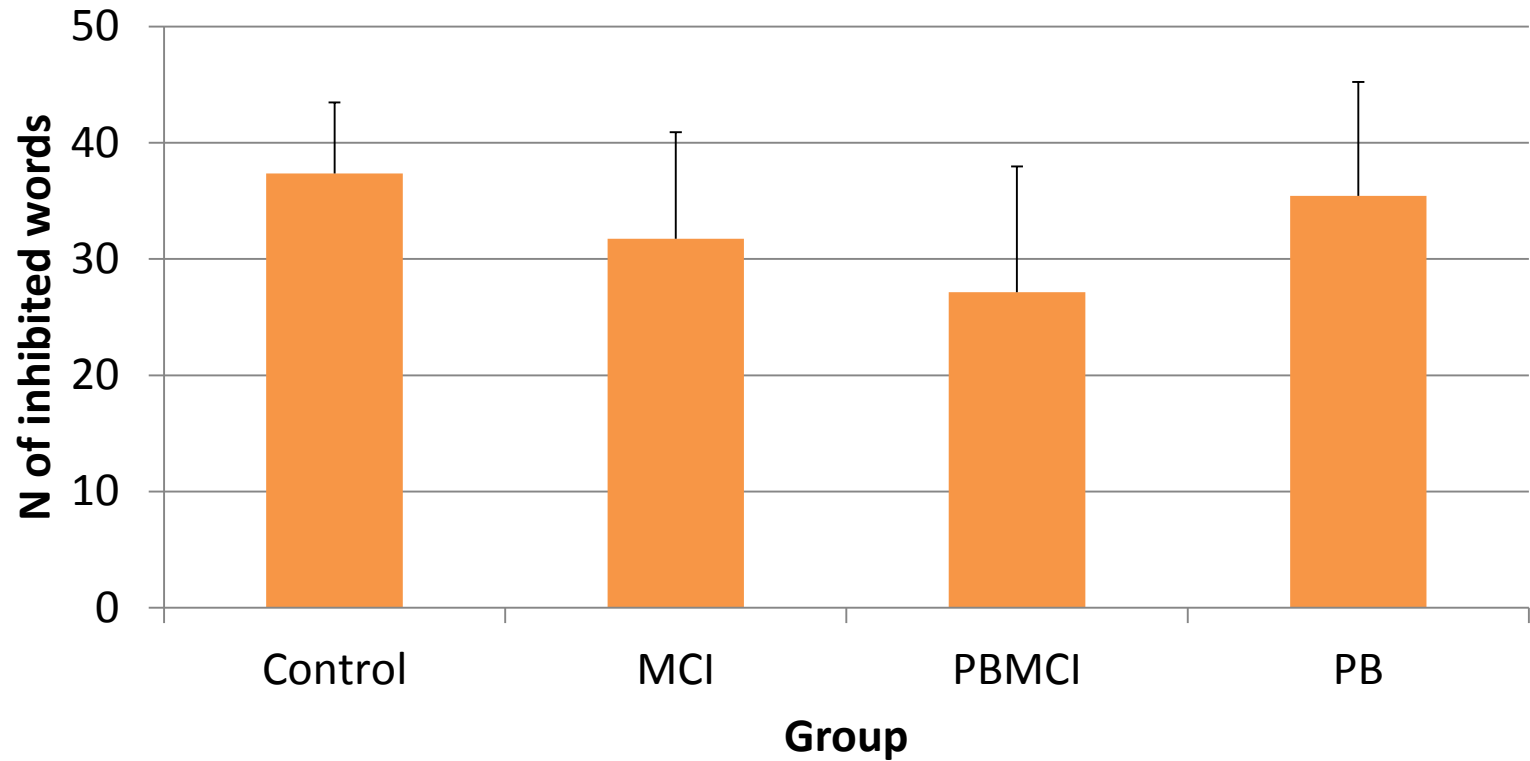

phonetic fluency: F = 3,660; p = 0,017
semantic fluency: F = 7,834; p = 0,000
switching fluency: F = 3,873; p = 0,013

Tower test performance

$F = 4{,}502$; $p = 0{,}006$

Stroop test performance

$F = 4,132; p = 0,010$

most of the neuropsychological tests can differentiate
between different subgroups in our sample

switching (TMT) and long-delay verbal memory
recall (CVLT) – greatest differences

post-hoc analysis: no differences between MCI
and PB$_{MCI}$ group

in contrast to the population as a whole, where anmestic
MCI is the most common subtype, non-amnestic PD-MCI
dominates (Yarnal, et al., 2013)

Goldman & Litvan (2011): PD-MCI has
heterogenous cognitive phenotype

Sample information

	Control	MCI	PD_{MCI}	PD
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MCI_{mix}= 3

MCI_a= 4 MCI_{na}= 8

MCI_a= 12 MCI_{na}= 8
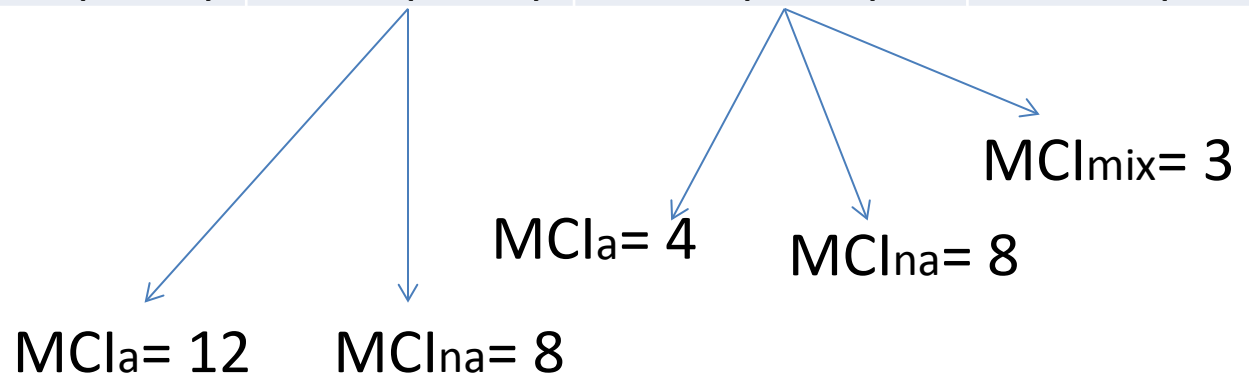
More PD-MCI subgroups?

F = 4,930; p = 0,004

Plans for the future

- combining neuropsychological results with other biomarkers

- increase sample and further subdivide MCI and PD-MCI group

- to expand our research longitudinally (track changes and assess clinical predictability of biomarkers)

Thank you for your attention!