



유 희 진
건국대병원

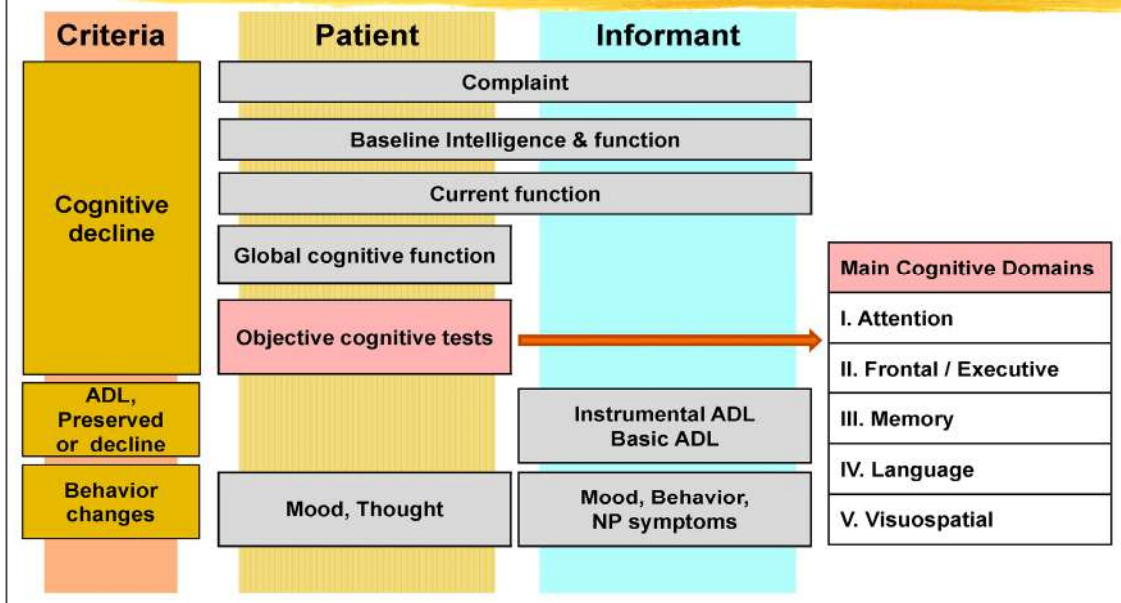
Contents

- 신경심리평가에 대한 이해
- SNSB-II의 구성과 특징
- SNSB-II의 실시
- SNSB-II 판독 및 사례

<신경심리평가에 대한 이해>

- 신경심리평가 vs 인지기능평가
- Screening vs Battery

Neuropsychological Assessment : Comprehensive test battery



Neuropsychological Battery

- **목적 및 유용성**
 - 포괄적이고 심층적인 종합평가
 - 인지, 정서 및 행동, 운동 영역 등 포함
 - 치매 조기 진단 및 변별 진단에 유용
 - 치료 효과 검증
 - 종합적인 추적 평가
- **주요 검사 및 구성**
 - SNSB(Seoul Neuropsychological Screening Battery)
 - CERAD(Consortium to Establish a Registry for Alzheimer's Disease)
 - LICA(Literacy Independent Cognitive Assessment)
 - + MMSE, CDR or GDS, Bathel-ADL, Instrumental-ADL, GDepS, NPI 등

Neuropsychological Screening Test

- **목적 및 유용성**
 - 짧은 시간에 치매를 선별할 목적으로 주로 실시됨
 - 간단한 추적 평가
- **주요 검사**
 - MMSE: focus on memory, language, literacy skills
 - MoCA: + executive function (verbal fluency, TMT, similarity)
 - K-AD8, IQCODE, K-LBCRS 등 간단한 보호자 설문지 활용
- **Screening set 구성의 예**
 - MMSE(or MoCA), CDR(or GDS), Bathel-ADL, Instrumental-ADL, GDepS, NPI 등

<SNSB-II의 구성과 특징>

- SNSB-II의 전체 구성
- 인지기능 영역의 검사들
- Cognitive Domain Score
- SNSB-C (SNSB-Core)

SNSB vs SNSB-II

	SNSB	SNSB-II
발행	2003년 10월	2012년 8월
표준화 표본	447명 (남 189/ 여 258)	1,067명 (남 600/ 여 467)
기준 연령	55-80세 (55-59/60-64/65-69 /70-74/75-80)	45-90세 (45-49/50-54/55-59/60-64/65-69/70- 74/75-79/80-84/85-90)
학력 구분	문맹/0-3년/4-6년/7-9년/10- 12년/13년 이상	문맹/0-3년/4-6년/7-9년 /10-12년/13-16년/17년 이상
지표 산출 방식	이론확률분포 근거	모형 기반
인지 영역 점수	-	+ (cognitive domain score)
단축형 제공	-	+ (SNSB-Core)
소검사 추가/변경	-	+

SNSB-II 전체 구성

Contents	
1. Basic Data	• Basic Information • Handedness
2. Cognitive Domain	• Attention • Language & Related Functions • Visuospatial Functions • Memory • Frontal/Executive Functions
3. Other Indexes	• K-MMSE (Korean-Mini Mental State Examination) • SGDS (short form of Geriatric Depression Scale) • Barthel-ADL (Barthel Activities of Daily Living) • K-IADL (Korean-Instrumental Activities of Daily Living) • CDR (Clinical Dementia Rating) • GDS (Global Deterioration Scale)

SNSB-II 인지 영역 구성

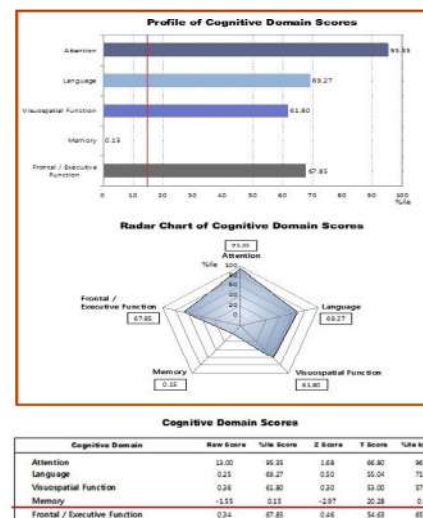
Cog. Domain	SNSB	SNSB-II 추가
Attention	• Digit Span Test(DST): Forward/Backward • Letter Cancellation	• Vigilance Test
Language & Related Functions	• Spontaneous Speech/Comprehension/Repetition • Korean-Boston Naming Test(K-BNT) • Reading/ Writing • Finger Naming/ Calculation/ Right-Left Orientation/ Body-Part Identification • Praxis Test: Buccofacial/ Ideomotor	
Visuospatial Functions	• K-MMSE: Drawing(interlocking pentagon) • Rey Complex Figure Test(RCFT): Copy	• Clock Drawing Test(CDT)
Memory	• K-MMSE: 3 word Registration & Recall • Seoul Verbal Learning Test-Elderly version(SVLT-E) : Immediate & Delayed Recalls/ Recognition • RCFT: Immediate & Delayed Recalls/ Recognition	
Frontal/ Executive Functions	• Contrasting Program/ Go-No-Go • Fist-Edge-Palm/ Alternating Hand Movement • Alternating Square & Triangle/ Luria Loop • Controlled Oral Word Association Test(COWAT) • Semantic(Animal, Supermarket), Phonemic(ㄱ, ㅁ, ㅂ) • Korean-Color Word Stroop Test(K-CWST)	• Digit Symbol Coding(DSC) • Korean-Trail Making Test-Elderly Version(K-TMT-E) • K-CWST-60

SNSB-II에서 함께 시행되는 other indexes

Other indexes	Contents
K-MMSE	- General cognition - Score range: 0~30점 (점수 클수록 기능 양호) - 연령, 학력에 따른 기준 적용
SGDS	- Screening for depression - Score range: 0~15점 (점수 클수록 depressed) - Cutoff: 8점 (8점 이상이면 r/o depression)
Barthel-ADL	- 신체 기능 위주의 기본적인 일상생활 기능 평가 - Score range: 0~20점 (점수 클수록 기능 양호)
K-IADL	- 인지기능 수반되는 복잡한 기능 위주의 일상생활 기능 평가 - 문항 수: 11개 - Score range: 0~1점 (total raw score / 11-해당없음 항목 수) - Raw score range: 0~33점 (점수 클수록 기능 저하) - Cutoff= 0.43점 (0.43점 이상이면 IADL 저하)
CDR	CDR (global) score: 0~5 CDR Sum of Boxed score: 0~30
GDS	1(인지장애 없음)~7(후기 중증의 인지장애)

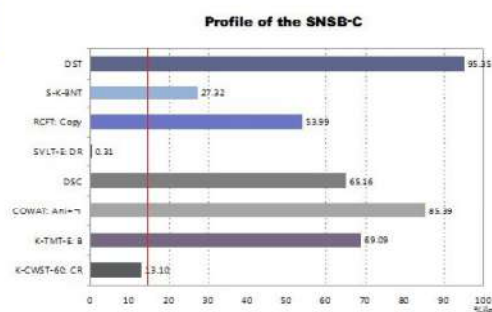
SNSB-II Cognitive Domain Scores

Cognitive Domain	Cognitive Domain Tests
Attention	DST: Forward + Backward
Language	- Comprehension - Repetition - K-BNT
Visuospatial Functions	- RCFT: Copy - CDT
Memory	- SVLT-E: IR, DR, Recognition - RCFT: IR, DR, Recognition
Frontal/Executive Functions	- Go-No-Go - COWAT: Phonemic - K-CWST: CR - DSC - K-TMT-E: Part B



SNSB-Core (SNSB-II short form)

Cognitive Domain	SNSB-Core Tests
Attention	• DST: Forward + Backward
Language	• S-K-BNT (form B)
Visuospatial Functions	• RCFT: Copy
Memory	• SVLT-E: Delayed Recall
Frontal/ Executive Functions	• Digit Symbol Coding(DSC) • COWAT: animal+Phonemic(ㄱ) • K-TMT-E: Part B • K-CWST-60: CR



<SNSB-II의 실시>

- SNSB-II 실시 관련 기본 사항
- 인지 영역별 개별 검사 실시

SNSB-II 실시 관련 기본 사항들

- **대상자**
 - 기준 포함 연령: 45-90세
 - 인지기능평가 및 신경심리평가가 요구되는 자
- **실시자 및 평가자**
 - 검사 실시 및 해석을 위한 교육과 자격을 갖춘 자
- **실시 환경**
 - 조용하고 편안한 공간, 보청기 및 돋보기, 일대일 검사
 - 충분한 라포 형성과 대상자의 특성에 맞는 적절한 대처가 필요
 - 신뢰로운 보호자
- **채점에 필요한 필수 인적 사항**
 - 만 나이(실제 생일과 띠로 확인)/ 성별/ 학력 년수
- **소요되는 시간 (1st. Full Ass.)**
 - 인지기능 환자 평가: 약 1시간
 - 보호자 면담 및 MMSE, CDR 등 other indexes: 약 1시간
 - 채점 및 보고서 작성

SNSB-II 인지 영역별 개별 검사 실시

Cog. Domain	SNSB	SNSB-II 추가
Attention	• Digit Span Test(DST): Forward/Backward • Letter Cancellation	• Vigilance Test
Language & Related Functions	• Spontaneous Speech/Comprehension/Repetition • Korean-Boston Naming Test(K-BNT) • Reading/ Writing • Finger Naming/ Calculation/ Right-Left Orientation/ Body-Part Identification • Praxis Test: Buccofacial/ Ideomotor	
Visuospatial Functions	• K-MMSE: Drawing(interlocking pentagon) • Rey Complex Figure Test(RCFT): Copy	• Clock Drawing Test(CDT)
Memory	• K-MMSE: 3 word Registration & Recall • Seoul Verbal Learning Test-Elderly version(SVLT-E) : Immediate & Delayed Recalls/ Recognition • RCFT: Immediate & Delayed Recalls/ Recognition	
Frontal/ Executive Functions	• Contrasting Program/ Go-No-Go • Fist-Edge-Palm/ Alternating Hand Movement • Alternating Square & Triangle/ Luria Loop • Controlled Oral Word Association Test(COWAT) : Semantic(Animal, Supermarket), Phonemic(ㄱ, ㅁ, 스) • Korean-Color Word Stroop Test(K-CWST)	• Digit Symbol Coding(DSC) • Korean-Trail Making Test-Elderly Version(K-TMT-E) • K-CWST-60

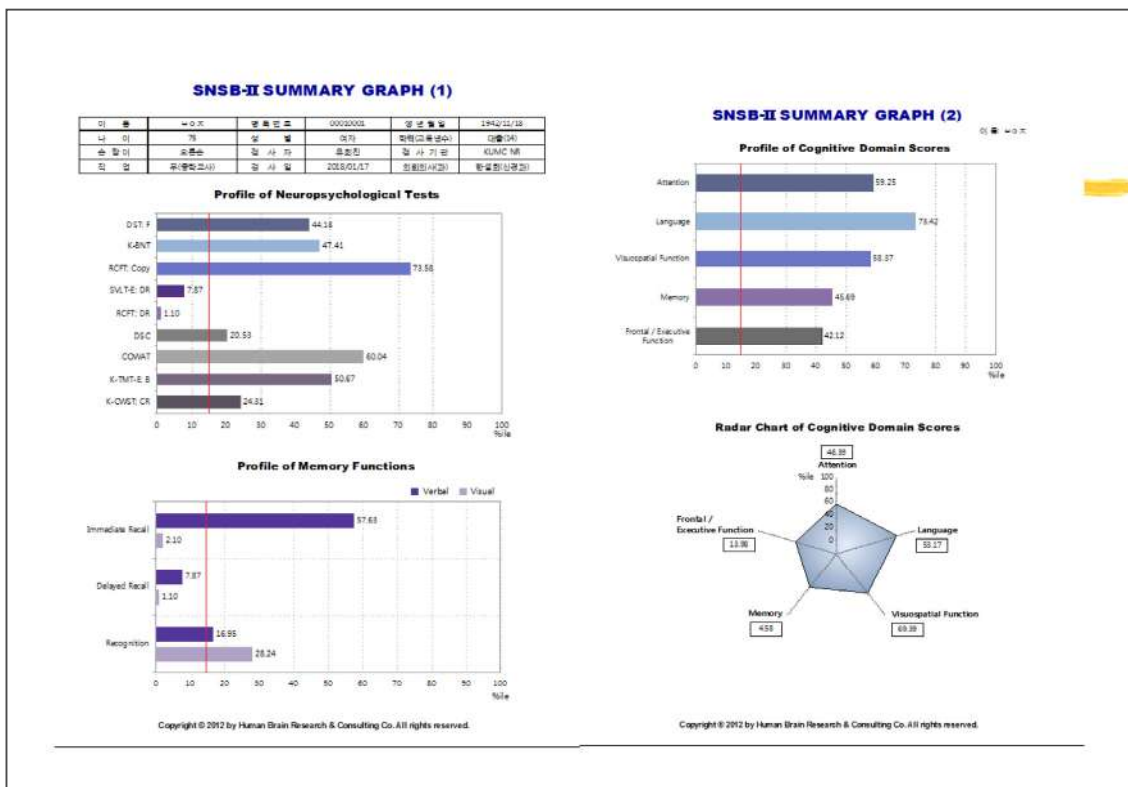
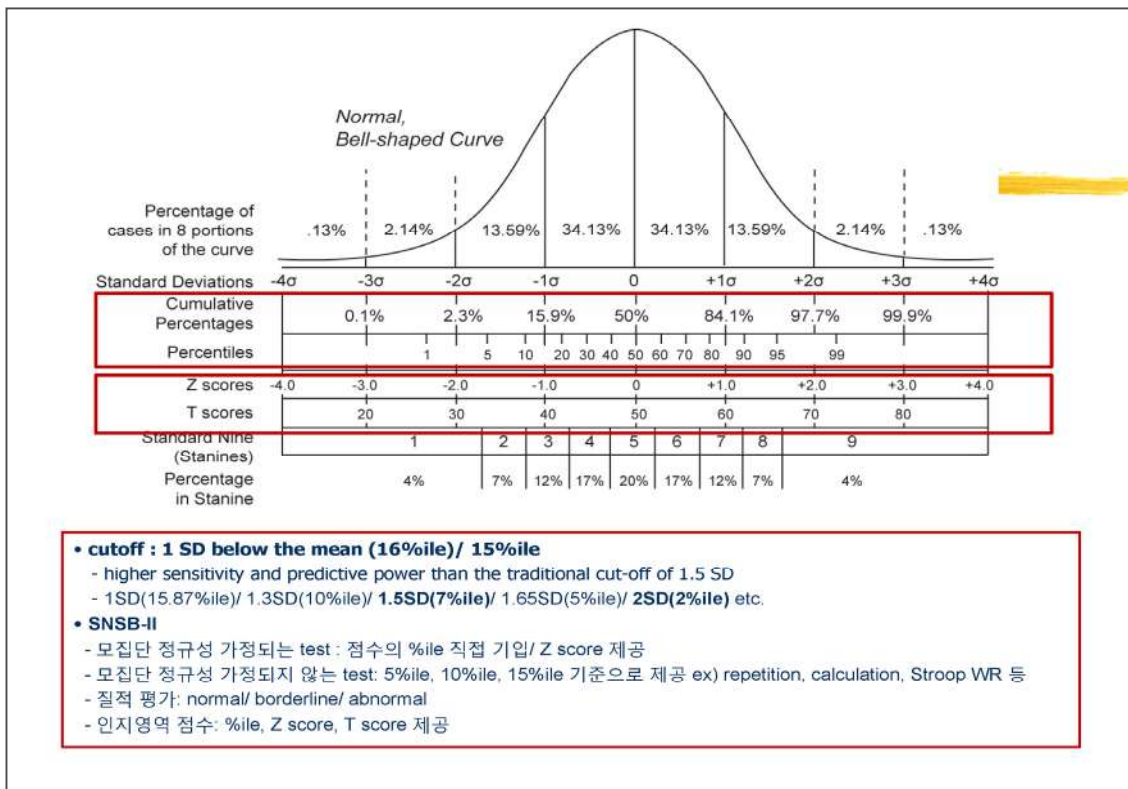
• 문맹 기준 없는 검사들

Scoring Criteria		
Score	Accuracy	Placement
2	Accuracy shown	Correctly placed
1	Accuracy shown	Incorrectly placed
1	Incorrectly shown	Correctly placed
0.5	Incorrectly shown, but recognizable	Incorrectly placed
0	Incorrectly shown, and unrecognizable, or omitted	Incorrectly placed

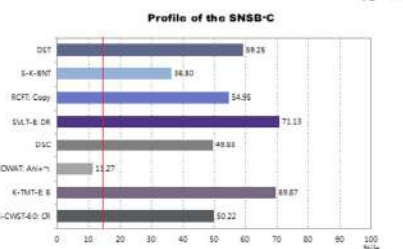
Scoring Element	Cups	Immediate Result	Default Result (20 min)
1. Vertical cross	2 1 0 0 0	2 1 0 0 0	2 1 0 0 0
2. Large rectangle	2 1 0 0 0	2 1 0 0 0	2 1 0 0 0
3. Diagonal cross	2 1 0 0 0	2 1 0 0 0	2 1 0 0 0
4. Horizontal middle of large rectangle (2)	2 1 0 0 0	2 1 0 0 0	2 1 0 0 0
5. Vertical middle of large rectangle (2)	2 1 0 0 0	2 1 0 0 0	2 1 0 0 0
6. Small rectangle	2 1 0 0 0	2 1 0 0 0	2 1 0 0 0
7. Small horizontal line above small rectangle (2)	2 1 0 0 0	2 1 0 0 0	2 1 0 0 0
8. Four parallel lines	2 1 0 0 0	2 1 0 0 0	2 1 0 0 0
9. Small triangle above large rectangle (2)	2 1 0 0 0	2 1 0 0 0	2 1 0 0 0
10. Small vertical line within large rectangle (2)	2 1 0 0 0	2 1 0 0 0	2 1 0 0 0
11. Circle with three dots	2 1 0 0 0	2 1 0 0 0	2 1 0 0 0
12. Five parallel lines	2 1 0 0 0	2 1 0 0 0	2 1 0 0 0
13. Dimes of large triangle attached to large rectangle (2)	2 1 0 0 0	2 1 0 0 0	2 1 0 0 0
14. Diamond	2 1 0 0 0	2 1 0 0 0	2 1 0 0 0
15. Vertical line within sides of large triangle (15)	2 1 0 0 0	2 1 0 0 0	2 1 0 0 0
16. Horizontal line within sides of large triangle (15)	2 1 0 0 0	2 1 0 0 0	2 1 0 0 0
17. Horizontal cross	2 1 0 0 0	2 1 0 0 0	2 1 0 0 0
18. Square attached to large triangle (2)	2 1 0 0 0	2 1 0 0 0	2 1 0 0 0

B

1/30 1/30



SNSB-II SUMMARY GRAPH (3)



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SNSB-II SUMMARY TABLE (1)

이름	W.O.K	생년월일	0001/0001	성별	나이	1945/11/18
나이	75	성	남	한국(조선족)	대한민국	대한민국
출생지	충청남도	출생지	충청남도	출생지	충청남도	충청남도
직업	교사(충청남도)	직업	교사(충청남도)	직업	교사(충청남도)	직업
검사일	2018/05/17	검사일	2018/05/17	검사일	2018/05/17	검사일

Test	Raw Score	%ile Score	Z Score	%ile by Sex
Attention				
Vigilance test	Normal			
Digit Span Test Forward	6	44.18	-0.15	43.79
Backward	4	48.62	-0.08	52.22
Forward-Backward	2	50.86	0.02	
Letter cancellation	Normal			
Neglected side				
Language & Related Functions				
Spontaneous speech: Fluency	Fluent			
Contents	Normal			
Comprehension	Normal			
Repetition	15	15%		
Korean-Boston Naming Test (K-BNT)	48	47.41	-0.06	57.02
Short form of the K-BNT (S-K-BNT)	8	1.06	-2.81	2.18
Reading	Normal			
Writing	Normal			
Finger naming	Normal			
Right-left orientation	Normal			
Body-part identification	Normal			
Calculation: Addition (+)	8	15%		
Subtraction (-)	3	15%		
Multiplication (x)	3	15%		
Division (/)	3	15%		
Total score	12	15%		
Praxis Memory	6	15%		
Recall	Normal			

SNSB-II SUMMARY TABLE (2)

Test	Raw Score	%ile Score	Z Score	%ile by Sex
Visuospatial Functions				
Clock Drawing Test (CDT)	1			
Numbers	1			
Time setting	1			
Total score	3	15%		
Rey Complex Figure Test (RCFT): Copy score	35	73.58	0.63	67.26
Copy time (sec)	286	11.23	-1.21	17.72
Memory				
Seoul Verbal Learning Test-Elderly's version (SVLT-E)				
Immediate recall: Trial 1	6			
Trial 2	7			
Trial 3	9			
Total score	21	57.63	0.19	44.24
Delayed recall	3	7.87	-1.41	3.83
Recognition: True positive	11	68.13	0.47	62.66
False positive	4	0.78	-2.42	0.56
Recognition score	19	16.95	-0.96	12.29
Recognition discriminability index	79.17	17.27	-0.94	12.40
Rey Complex Figure Test (RCFT)				
Immediate recall	3.5	21.0	-0.08	2.23
Delayed recall	2	1.10	-2.28	1.02
Recognition: True positive	7	4.88	-1.68	3.89
False positive	0	8.87	1.17	
Recognition score	19	28.24	-0.58	26.13
Recognition discriminability index	79.17	28.23	-0.58	25.96
Frontal / Executive Functions				
Motor impersistence	Normal			
Contrasting program	20	15%		
Go-No go	54	<5		
Fit-Edge-Palm: Right	Borderline			
Left	Normal			
Alternating hand movement	Normal			
Alternating square & triangle	Deformed			
Link loop	Normal			

SNSB-II SUMMARY TABLE (3)

Test	Raw Score	%ile Score	Z Score	%ile by Sex
Frontal / Executive Functions (Cont.)				
Controlled Oral Word Association Test (COWAT)				
Animal	19	75.76	0.70	75.51
Supermarket	9	6.95	-1.53	2.66
ㅁ	9	44.37	-0.14	
0	10	57.05	0.18	
ㅏ	12	73.09	0.62	76.76
Phonemic total score	31	60.04	0.25	
Animal > ㅁ	28	64.10	0.96	66.73
Korean-Color Word Stroop Test (K-CVST)				
Word Reading (WR): Number of correct response	112	15s		
Number of error response	0	15s		
Response time (sec)	63			
Correct response rate	1.00	15s		
Time-per-item	0.56	70.94	0.94	
Color Reading (CR): Number of correct response	74	24.81	-0.70	19.43
Number of error response	0	15s		
Response time (sec)	120			
Correct response rate	1.00	15s		
Time-per-item	1.62	31.81	-0.47	26.25
Interference score	1.06	22.47	-0.76	19.47
Korean-Color Word Stroop Test-60 seconds (K-CVST-60)				
Word Reading (WR): Number of correct response	108	15s		
Number of error response	0	15s		
Color Reading (CR): Number of correct response	88	29.97	-0.53	19.06
Number of error response	0	15s		
Digit Symbol Coding (DSC): Correct	40	20.53	-0.82	17.05
Error	0	15s		
Korean-Trial Making Test-Elderly's version (K-TMT-E)				
Part A: Success / Fail / NA	Success			
Time	24	64.96	0.12	66.42
Error	0			
Part B: Success / Fail / NA	Success			
Time	50	50.67	0.02	48.99
Error	2	5s < 10		

SNSB-II SUMMARY TABLE (4)

Test	Raw Score	%ile Score	Z Score	%ile by Sex
Other Indexes				
Korean-Mini Mental State Examination (K-MMSE)				
Orientation to time	8	15s		
Orientation to place	5	15s		
Registration	3	15s		
Attention & calculation	4	15s		
Recall	1	10s < 15		
Language	8	15s		
Drawing*	1	2.44s		
Total score	27	16.69	-0.97	15.18
Short Version of the Geriatric Depression Scale (SGDS)				
Bathel-Activities of Daily Living (Bathel-ADL)	20			
Korean-Instrumental Activities of Daily Living (K-IADL)				
Sum	3			
No. of NA items	1			
Score	0.3			
Clinical Dementia Rating (CDR): Score	0.5			
Sum of boxes	2			
Global Deterioration Scale (GDS)	3			

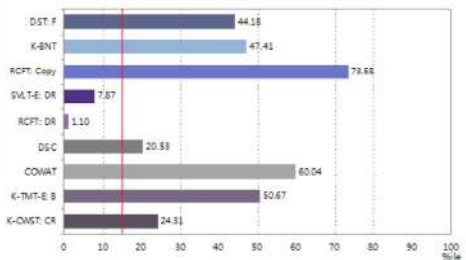
* 그림수가 0일 때는 1월이므로 박봉수, 그림수가 1일 때는 이봉수로 표시함

Cognitive Domain Scores

Cognitive Domain	Raw Score	%ile Score	Z Score	T Score	%ile by Sex
Attention	10.00	46.39	-0.09	48.09	52.09
Language	0.19	53.17	0.08	50.80	54.56
Visuospatial function	0.50	69.39	0.51	55.07	61.99
Memory	-0.76	4.58	-1.69	33.13	2.48
Frontal / Executive function	-0.18	13.98	-1.08	39.19	11.48

Test	Raw Score	%ile Score	Z Score	%ile by Sex
Visuospatial Functions				
Clock Drawing Test (CDT): Contour				
Numbers	1			
Time setting	1			
Total score	2	15s		
Rey Complex Figure Test (RCFT): Copy score				
Copy time (sec)	35	73.58	0.63	67.26
	286	11.23	-1.21	17.72
Memory				
Seoul Verbal Learning Test-Elderly's version (SVLT-E)				
Immediate recalls: Trial 1				
Trial 2	5			
Trial 3	7			
Total score	9			
	21	67.63	0.19	44.54
Delayed recall				
	3	7.87	-1.41	3.83
Recognition: True positive				
False positive	11	68.13	0.47	62.66
	4	0.78	-2.42	0.56
Recognition score	19	16.95	-0.96	12.29
Recognition discriminability index	79.17	17.27	-0.94	12.40

Profile of Neuropsychological Tests

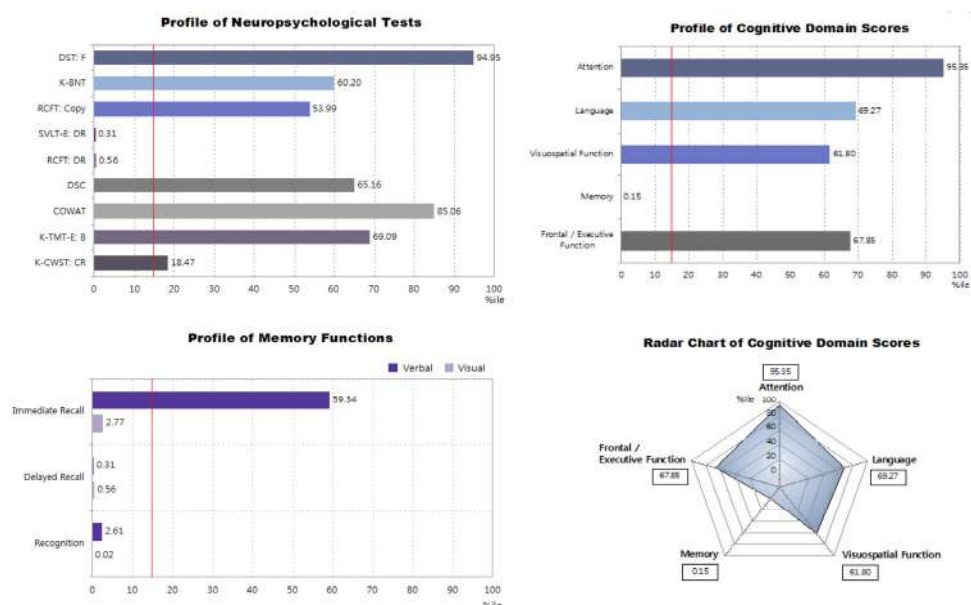


Cognitive Domain Scores

Cognitive Domain	Raw Score	%ile Score	Z Score	T Score	%ile by Sex
Attention	10.00	46.39	-0.09	48.09	52.09
Language	0.19	53.17	0.08	50.80	54.56
Visuospatial Function	0.50	69.39	0.51	55.07	61.99
Memory	-0.76	4.58	-1.69	33.13	2.48
Frontal / Executive function	-0.18	13.98	-1.08	39.19	11.48

Case 1

- 72세, 여자, 고졸, 오른손잡이, 주부
 - 기억력이 갈수록 떨어지는 것 같아 치매 걱정
 - 환자 스스로 신경심리평가 원해서 내원함
 - 가족들도 잦은 실수 지적하는 상황
 - 일상적인 일 처리에 큰 곤란은 호소되지 않음
- 주요 검사 결과들
 - Med: 고혈압(3년), 골다공증(3년)
 - B-MRI: minimal brain atrophy(age-appropriate), no MTA
 - ApoE: E3/E4
 - Family Hx: 모친 치매(75세경 치매 증상 시작, 82세 사망)



이름	성명	생년월일	성별	생년월일	생년월일
나 이	72	성명	성명	성명	1941.01.01
성명	성명	성명	성명	성명	성명
성명	성명	성명	성명	성명	성명

Test	Raw Score	%ile Score	Z Score	%ile by Sex
Attention				
Vigilance test				
Digit Span Test: Forward	8	94.95	1.64	95.41
Backward	8	87.87	1.14	88.89
Forward-Backward	8	20.90	-0.81	
Letter cancellation				
Neglected side				
Language & Related Functions				
Spontaneous speech: Fluency	Fluent			
Contents	Normal			
Comprehension	Normal			
Repetition	15	15%		
Korean-Boston Naming Test (K-BNT)	50	60.20	0.28	67.35
Short form of the K-BNT (S-K-BNT)	11	27.32	-0.60	38.08
Reading	Normal			
Writing	Normal			
Finger naming				
Right-left orientation				
Body-part identification				
Calculations: Addition (+)	8	15%		
Subtraction (-)	8	15%		
Multiplication (x)	8	15%		
Division (/)	8	15%		
Total score	12	15%		
Praxis Ideomotor				
Buccal facial				

Test	Raw Score	%ile Score	Z Score	%ile by Sex
Visuospatial Functions				
Clock Drawing Test (CDT): Contour	1			
Numbers	1			
Time setting	1			
Total score	3	15%		
Ray Complex Figure Test (RCFT): Copy score	35	63.66	0.10	48.64
Copy time (Sec)	156	68.11	0.19	79.95
Memory				
Seoul Verbal Learning Test-Bikely's version (SVLT-B)				
Immediate recall: Trial 1	6			
Trial 2	7			
Trial 3	8			
Total score	21	69.34	0.24	71.45
Delayed recall	0	0.00	-2.74	0.00
Recognition: True positive	10	48.58	-0.16	37.14
False positive	5	0.10	-3.10	0.06
Recognition score	17	2.61	-1.94	1.65
Recognition discriminability index	70.83	2.74	-1.92	1.71
Ray Complex Figure Test (RCFT)				
Immediate recall	15	2.77	-1.92	1.05
Delayed recall	0	0.00	-2.94	0.06
Recognition: True positive	2	4.01	-4.32	0.00
False positive	1	70.00	0.88	
Recognition score	13	0.02	-3.87	0.02
Recognition discriminability index	54.17	0.02	-5.58	0.02
Frontal / Executive Functions				
Motor Impersistence	Normal			
Concealing program	20	15%		
Go-No go	20	15%		
Non-Edge-Palm: Right	Normal			
Left	Normal			
Alternating hand movement	Normal			
Alternating square & triangle	N/A			
Luria loop	Normal			

Test	Raw Score	%ile Score	Z Score	%ile by Sex
Frontal / Executive Functions (Cont.)				
Controlled Oral Word Association Test (COWAT):				
Animal	18	72.37	0.59	75.01
Supermarket	18	89.21	1.24	
~	10	47.41	0.46	
~	12	81.85	0.91	88.72
Phonemic total score	15	85.06	1.04	
Animal + ~	31	85.39	1.05	86.92
Korean-Color Word Stroop Test (K-CWST):				
Word Reading (WR): Number of correct response	112	15%		
Response time (sec)	68			
Correct response rate	1.00	15%		
Time-per-item	0.58	70.91	0.55	
Color Reading (CR): Number of correct response	67	18.47	-0.80	14.57
Number of error response	7	5.4 < 10		
Response time (sec)	120			
Correct response rate	0.91	5.4 < 10		
Time-per-item	1.62	94.60	-0.40	29.95
Interference score	1.04	24.29	-0.70	20.61
Korean-Color Word Stroop Test-60 seconds (K-CWST-60):				
Word Reading (WR): Number of correct response	104	15%		
Number of error response	0	15%		
Color Reading (CR): Number of correct response	29	13.10	-1.12	8.45
Number of error response	6	4.5		
Digit Symbol Coding (DSC): Correct	50	65.16	0.39	62.55
Error	0	15%		
Korean-Trail Making Test-Older's version (K-TMT-O):				
Part A: Success / Fail / NA	Success			
Time	22	69.23	0.50	71.96
Error	0			
Part B: Success / Fail / NA	Success			
Time	42	69.09	0.50	70.45
Error	0	15%		

Test	Raw Score	%ile Score	Z Score	%ile by Sex
Other Indexes				
Korean-Mini Mental State Examination (K-MMSE)				
Orientation to time	3	4.5		
Orientation to place	4	4.5		
Registration	3	15%		
Attention & calculation	5	15%		
Recall	3	15%		
Language	8	15%		
Drawing*	1	3.51%		
Total score	27	23.68	-0.72	23.37
Short Version of the Geriatric Depression Scale (SGDS)	4			
Bathel-Activities of Daily Living (Bathel-ADL)	20			
Korean-Instrumental Activities of Daily Living (K-IADL)				
Sum	4			
No. of NA items	0			
Score	0.86			
Clinical Dementia Rating (CDR)	Score	0.5		
Sum of boxes	1.5			
Global Deterioration Scale (GDS)	3			

* 그림수가 0점 또는 1점 이하로 기록된 경우는 측정값 미판 또는 이상으로 표시함

Cognitive Domain Scores

Cognitive Domain	Raw Score	%ile Score	Z Score	T Score	%ile by Sex
Attention	13.00	95.35	1.68	66.80	96.40
Language	0.25	69.27	0.30	55.04	71.43
Visuospatial Function	0.36	61.80	0.30	53.00	57.00
Memory	-1.55	0.15	-2.97	20.28	0.07
Frontal / Executive Function	0.34	67.85	0.46	54.63	65.94

F/72(12edu), Rt. hander	
주호소	- 갈수록 기억력 저하 심해짐 - 집중력 저하
인지 기능 평가	- memory impairments : verbal & visual 모두 storage deficits 시사 - unstable executive functions - other: normal
기분	K-MMSE=27/30(23.68%ile) (orientation time -2/ place -1)
ADL	- SGDS=4/15 (cutoff: 8) - K-IADL=0.36 (cutoff: 0.43) - Barthel-ADL=20/20
CDR /GDS	- CDR(SB)=0.5(1.5) (memory 0.5/ orientation 0.5/ home & hobbies 0.5) - GDS=3
진단 인상	R/O amnesic MCI, single domain

Mild Cognitive Impairment

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

MCI

Memory impaired?

Yes: **Amnesic MCI** (Single domain, Multiple domain)
No: **Non-amnesic MCI** (Single domain, Multiple domain)

MCI Criteria Key Symposium JIM, 2004

DMS-5: Mild Neurocognitive Disorder

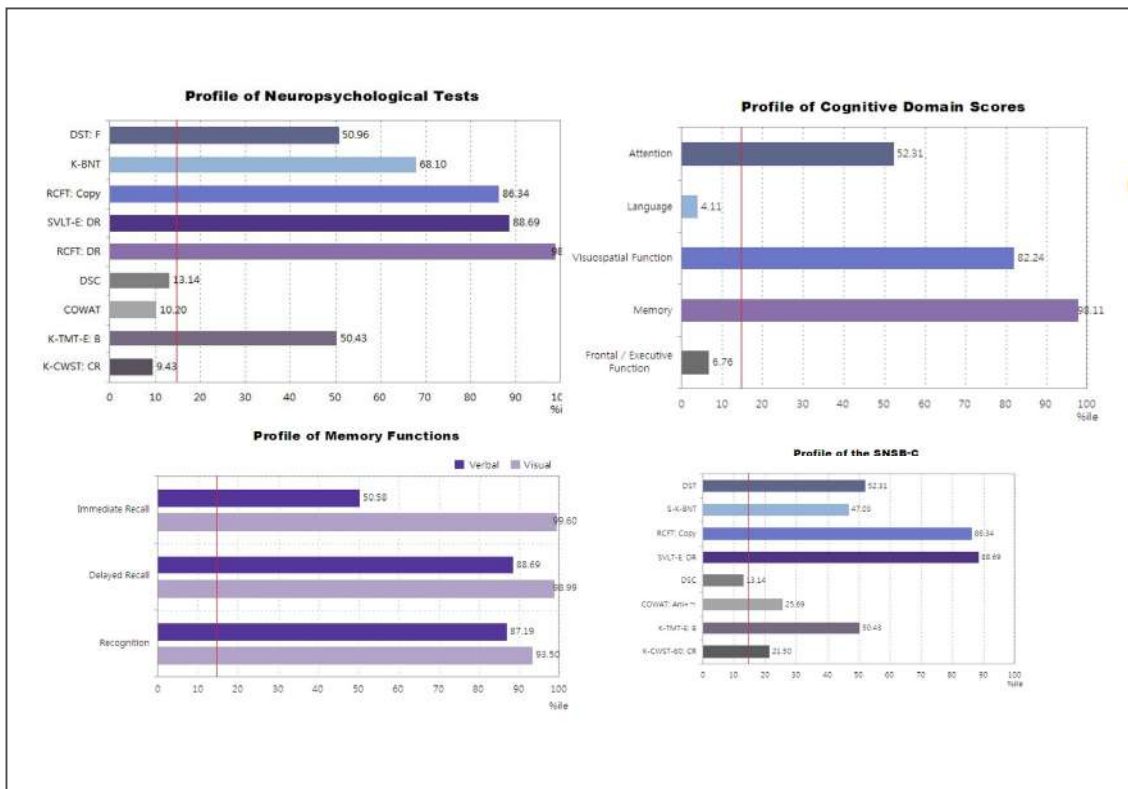
MCI due to AD

- Uncertain: No or conflicting Aβ or MRI or FDG PET
- Intermediate: Plus biomarker for Aβ OR MRI or FDG PET
- High: Plus biomarker for Aβ AND MRI or FDG PET
- Prodromal AD: Plus biomarker for Aβ or tau/Aβ

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Case 2

- 71세, 남자, 고졸, 오른손잡이, 전직 선원/ 65세 정년(조선소 용접일)
 - 행동 변화(2-3년 전부터 서서히)
 - 폭력성 증가: 부인을 때리거나 감금/ 욕을 함
 - 부적절한 행동: 부인 옷을 가지고 나감/ 대소변 아무데나 봄
 - 과도한 부부관계 요구/ 비아그라, 정력 주사 등 찾아 다님
 - 자살함 저하: 젊어서는 집안 일 잘 도와줌
 - 충동성 증가: 무단횡단 등(젊어서는 준법 등 고지식한 편이었음)
 - 식욕 증가
 - 사회 활동 없고, 등산을 정해진 요일에 부인과 꼭 같이 가려 함
 - 경한 기억력 저하 (2-3년 전부터, 최근까지 큰 차이 없음)
 - 자신이 한 일을 하지 않았다고 하는 경우 있음
 - 현관 비밀번호 기억 못해 열지 못한 경우 있었음
- 주요 검사 결과들
 - B-MRI: mild to moderate hippocampal atrophy, bilaterally
 - Brain SPECT: mild hypoperfusion, bilateral basal frontal and anterior temporal
 - ApoE: E3/E3
 - Family Hx (-)



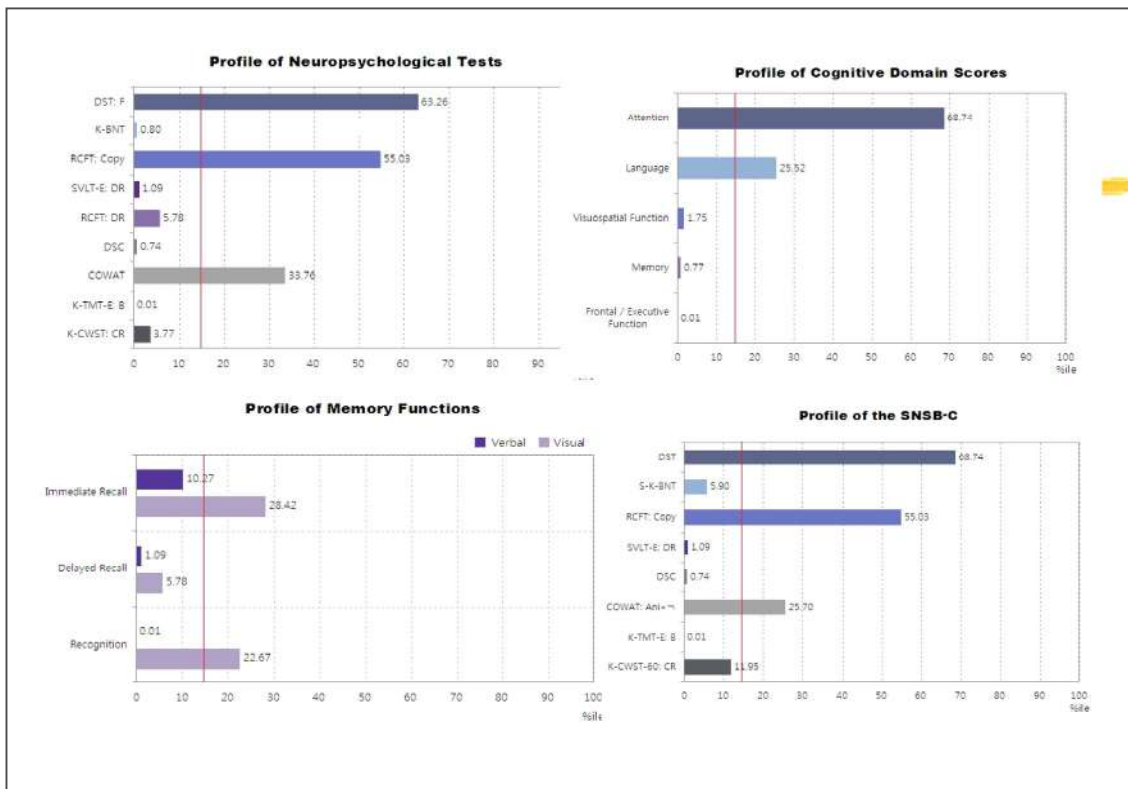
Test	Raw Score	%ile Score	Z Score	%ile by Sex
Attention				
Vigilance test	Normal			
Digit Span Test: Forward	6	50.96	0.02	48.72
Backward	4	52.97	0.07	50.38
Forward-Backward	2	49.80	0.00	
Letter cancellation	Normal			
Neglected side				
Language & Related Functions				
Spontaneous speech: Fluency	Fluent			
Contents	Normal			
Comprehension	Normal			
Repetition	13	<5		
Korean-Boston Naming Test (K-BNT)	50	68.10	0.47	53.81
Short form of the K-BNT (S-K-BNT)	12	47.03	-0.07	34.77
Reading	Normal			
Writing	Normal			

Repetition item 5. 그가/ 내 / 뒤를/ 몰래/ 밟았다
" 그가 내 뒤를 밟아 왔다 "

M/71(12edu), Rt. Hander, 전직: 선원, 조선소 용접일	
Chief Complaints	• 행동 변화 (2-3년 전부터, 서서히) - 폭력성, 충동성, 성욕, 식욕, 사고의 경직성 등 증가 - 감정 억제능력, 자살함 저하 - 부적절한 행동 • 지속적인 경한 기억력 저하 • 계산 곤란 환자 호소
Objective Cog. tests	• dominant frontal/executive dysfunctions • repetition 저하 • 100 7 저하: 5~10%ile
General Cog.	• K-MMSE=28/30(46.92%ile) (100-7: 3/5)
Depression	• SGDS=0/15 (cutoff: 8)
NPI	• 17/144 (eating 6, apathy 3, aggression 2, sleep 2, anxiety 1, elation 1, disinhibition 1, irritability1)
ADL	• K-IADL=0.6 (cutoff: 0.43) • Barthel-ADL=20/20
CDR/GDS	• CDR(SB)=0.5(2) (Memory 0.5/ Orientation 0/ Judgment and problem solving 0.5/ Community affairs 0.5/ Home and hobbies 0.5/ Personal care 0) • FTD-CDR(SB)=0.5(2.5) (+ behavior, comportment and personality 0.5) • GDS=3
Diagnostic Impression	• r/o early stage of behavioral variant of FTLD

Case 3

- 80세, 여자, 고졸, 오른손잡이, 건물 세 관리
 - 기억력 저하: 주로 보호자가 호소/ 환자 피상적 호소
 - 오랜만에 남동생 집 다녀온 것 기억 못함/ 반복 물음/ 약속 관리 곤란
 - 3년 전부터 서서히, 갈수록 저하
 - 건물 세 관리 독립적으로 잘 안됨
 - 단어를 빨리 대지 못하고 머뭇거림
 - 쉽게 화를 냄



F/80(12edu), Rt. Hander	
Chief Complaints	- 기억력 저하 3년 전부터 시작되어 갈수록 서서히 악화 - 건물 세 관리 독립적으로 잘 안됨 - 단어를 빨리 대지 못하고 머뭇거림 - 쉽게 화를 냄
Objective Cog. tests	- multiple cognitive impairments - memory impairments: verbal (storage deficit)/ visual (retrieval deficit) - executive dysfunctions - visuospatial dysfunction - anomia - acalculia
General Cog.	K-MMSE=24/30(2.56%ile) (3 word recall : 0/3)
Depression	SGDS=4/15 (cutoff: 8)
NPI	8/144 (sleep 3, eating 2, apathy 1, disinhibition 1, irritability1)
ADL	- K-IADL=0.7 (cutoff: 0.43) - Barthel-ADL=20/20
CDR/GDS	- CDR(SB)=0.5(4) (Memory 1/ Orientation 0.5/ Judgment and problem solving 0.5/ Community affairs 1/ Home and hobbies 0.5/ Personal care 0) - GDS=4
Diagnostic Impression	r/o early stage of AD

Neuropsychological Profile: deficits in AD

• Episodic memory deficit (clinical hallmark)

- impaired consolidation or storage of new information/ rapid forgetting
→ impaired free recall & recognition components of memory tests
- decreased inhibitory process → intrusion errors
- defective use of semantic information to bolster encoding

• Executive function deficits

- reduced ability to mentally manipulate information
→ TMT(B)↓, Digit span backward↓, Stroop color reading↓
- phonemic fluency↓, set shifting↓, self-monitoring↓, concept formation↓, sequencing↓, problem solving↓

• Deterioration of semantic memory / loss of knowledge

- difficulty in object naming
(cf. inability to retrieve or access semantic knowledge: anomia)
- more impaired on category fluency than letter fluency
- sorting ↓, matching ↓, definition generation ↓

• Visuospatial deficits

- constructional apraxia → RCFT copy, CDT
- visuo-perceptual deficit (typical AD early stage: mild)
cf) PCA: prominent visual agnosia & constructional apraxia, Balint's syndrome, Gerstmann's syndrome
- narrowing of the window of visuospatial attention (reaction time↑)

• Preserved immediate attention span → Digit span forward

Brief Case Summary

⌘ Amnestic vs. Non-Amnestic type

- amnestic (AD)
- non-amnestic
 - : executive, visuoconstruction (VD)
 - : early severe visuospatial, attention, executive dysfunction (DLB)
 - : frontal lobe dysfunctions (bvFTD)
 - : language (SD, PNFA, LPA)

⌘ Memory: storage deficits vs. retrieval deficits

⌘ Cortical dementia vs. Subcortical dementia

- cortical (ex. AD, PCA, SD etc.)
 - : specific domain ↓ & cognitive speed 상대적 유지
- subcortical: slowing of cognition, frontal/executive dysfunctions, memory retrieval deficits