The Scales of Cognitive and Communicative Ability for NeuroRehabilitation (SCCAN)
Psychometric Properties & Administration across the continuum of care

Lisa Milman & Alexis Missel, USHA, 2020

Speaker Disclosures

➢Lisa Milman, PhD, CCC-SLP

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Nonfinancial disclosures: None

➢Alexis Missel, BA, graduate student at Utah State University

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Presentation Outline

1. Assessment of communication and cognition: goals, priorities, & challenges
2. Brief measures of cognition and communication
3. Psychometric properties of the SCCAN
4. Administration procedures
5. Applications across the continuum of care

Assessment: Professional Importance

Clinical perspective

➤ Assist with differential diagnosis

➤ Guide treatment & discharge planning

➤ Measure change

➤ Justify reimbursement for

  ➤ Individual therapy

  ➤ Broad Programs of service

Research perspective

➤ Critical to the scientific development of our field by advancing our understanding of:

  ➤ Communication disorders

  ➤ Mechanisms of recovery & rehabilitation
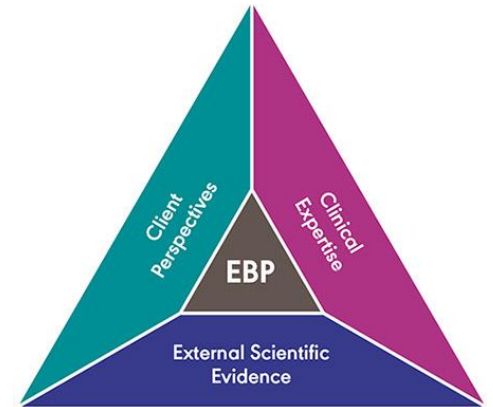
Assessment Goals:

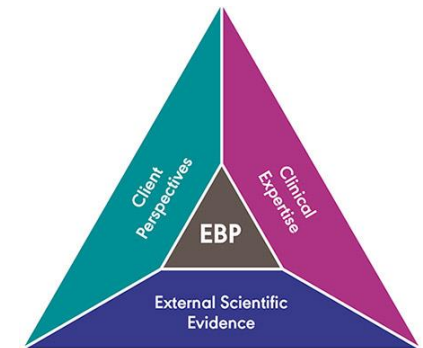## 1. Evidence Based Practice
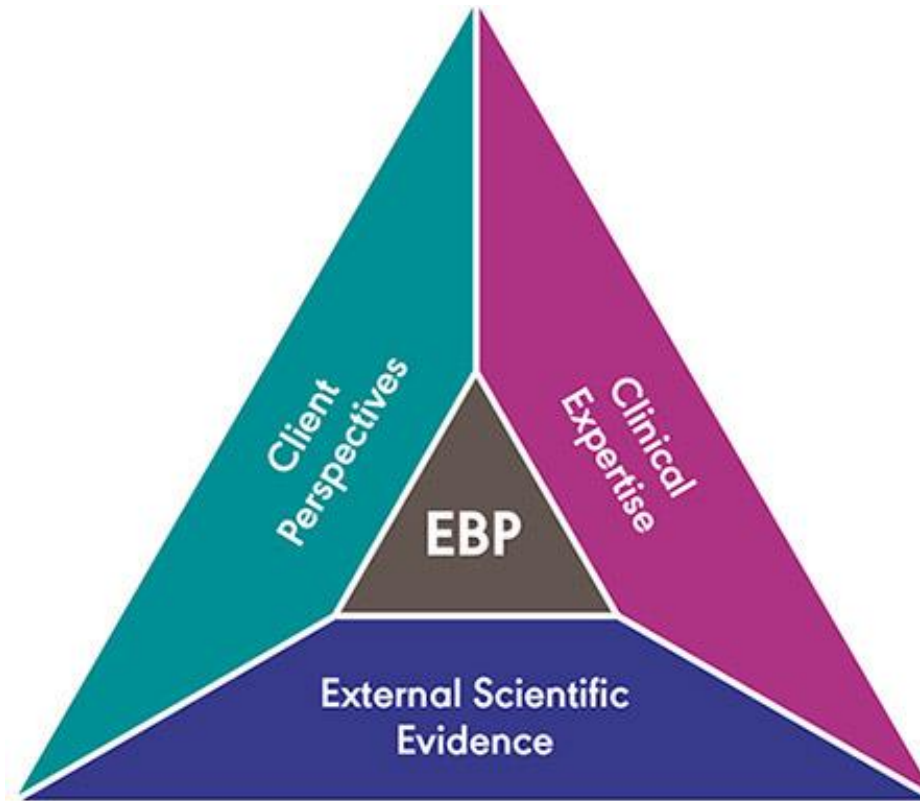
External Scientific Evidence: Psychometric Criteria

1. Reliability

2. Content Validity

3. Standardization (Generalizability Information)

4. Internal Validity

5. External Validity

6. Practical Validity

7. Evidence supporting specific test uses

Reviews of Psychometric Criteria: Websites/Search Engines

❑ Google Scholar

❑ Academic Search Premier

❑ APA PsycINFO

❑ CINAHL

❑ Medline

❑ ASHA

❑ APA

❑ SpeechBITE

❑ PsycBITE

About

speechBITE is a database of intervention studies across the scope of speech pathology practice. Find out more about this evidence-based practice initiative on the pages below.

Background

speechBITE was launched in 2008 by a team of speech pathologists at the University of Sydney who wanted easier access and better appraisal of research evidence in the area of communication and swallowing disorders.

EBP relevant to speech pathology

ASHA EBP technical report
ASHA's guidelines for EBP in speech-language pathology and audiology.

ASHA Compendium of EBP Guidelines and Systematic Reviews
This compendium contains an extensive list of clinical practice guidelines and systematic reviews relevant to speech-language pathology and audiology.

Academy of Neurologic Communication Disorders and Sciences (ANCDS)
The ANCDS provide evidence based practice guidelines for the management of communication disorders in neurologically impaired individuals.

Evidence-Based Practice Briefs
A publication that uses EBP principles to address specific clinical questions related to speech pathology practice.

ALTC report: Facilitating the Integration of Evidence Based Practice into Speech Pathology Curricula
Pages 75-84 of this report contain an extensive list of EBP resources relevant to speech pathology.

NSW Speech Pathology EBP Network
The NSW Speech Pathology EBP Network was established in 2002 by a network of speech pathologists in order to share the process of creating clinical questions, critiquing the evidence, and evaluating its practical application to clinical practice. There is a range of EBP clinical interest groups who meet frequently, in which critical appraised papers and topics are developed and placed on the website.

Evidence-Based Communication Assessment and Intervention
An international journal that provides appraisal of communication assessment and intervention studies, including expert commentary about the quality of the evidence as well as its practical implications.

PsycBITE is a database that catalogues studies of cognitive, behavioural and other treatments for psychological problems and issues occurring as a consequence of acquired brain impairment (ABI). These studies are rated for their methodological quality, evaluating various aspects of scientific rigour.

The website gives clinicians, students and researchers free access to the PsycBITE database, thus enabling you to search for articles which might be relevant for your clinical practice or your research in a time-efficient way.

EBM Online – Evidence-Based MedicineEvidence-Based Medicine surveys a wide range of international medical journals applying strict criteria for the quality and validity of research. Practising clinicians assess the clinical relevance of the best studies. The key details of these essential studies are presented in a succinct, informative abstract with an expert commentary on its clinical application.

Centre for Reviews and DisseminationCRD undertakes reviews of research about the effects of interventions used in health and social care. The centre maintains various databases, provides an enquiry service and disseminates results of research to NHS decision makers.

Health LinksTechniques for Locating Evidence Based Practice Resources: This site provides a number of links to resources regarding EBP, including information regarding the terminology used in EBP, overviews of systematic reviews and meta-analyses, clinical guidelines, links to sites which help find peer-reviewed journal articles and links to tutorials on EBP.

EBM Internet ResourcesThis is a selective and annotated listing of the major sites related to evidence-based practice (EBP).

CEBM – Centre for Evidence Based Medicine

CEBMH – Centre for Evidence-based Mental HealthThis website outlines the research and educational activities of this Centre, and also acts as a gateway to the range of resources developed by this Centre between 2000-2002. The UK NHS websites on depression, schizophrenia and suicide can be found through this site, alongside other sources of mental health evidence.

Agency for Healthcare Research and Quality (AHRQ)

AHRQ sponsors and conducts research that provides evidence-based information on health care outcomes; quality; and cost, use, and access. The information helps health care decision makers - patients and clinicians, health system leaders, purchasers, and policymakers-make more informed decisions and improve the quality of health care services.

The Cochrane CollaborationThe Cochrane Collaboration is an international not-for-profit organisation, providing up-to-date information about the effects of health care.

Reviews of Psychometric Criteria: Research Articles

Ahmadi, A., Tohidast, S. A., Mansuri, B., Kamali, M., & Krishnan, G. (2017). Acceptability, reliability, and validity of the Stroke and Aphasia Quality of Life Scale-39 (SAQOL-39) across languages: a systematic review. *Clinical rehabilitation*, *31*(9), 1201-1214.

Coleman, J. J., Frymark, T., Franceschini, N. M., & Theodoros, D. G. (2015). Assessment and treatment of cognition and communication skills in adults with acquired brain injury via telepractice: A systematic review**.** *American journal of speech-language pathology*, *24*(2), 295-315.

D'Souza, A., Mollayeva, S., Pacheco, N., Javed, F., Colantonio, A., & Mollayeva, T. (2019). Measuring change over time: A systematic review of evaluative measures of cognitive functioning in traumatic brain injury. *Frontiers in neurology*, *10*, 353.

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Milman, L. H., Faroqi-Shah, Y., Corcoran, C. D., & Damele, D. M. (2018). Interpreting MMSE performance in highly proficient bilingual Spanish-English and Asian Indian-English speakers: Demographic adjustments, item analyses, and supplemental measures. *Journal of Speech, Language, and Hearing Research*, *61*(4), 847.

Murray, L., Salis, C., Martin, N., & Dralle, J. (2018). The use of standardised short-term and working memory tests in aphasia research: a systematic review. *Neuropsychological rehabilitation*, *28*(3), 309-351.

Pritchard, M., Hilari, K., Cocks, N., & Dipper, L. (2017). Reviewing the quality of discourse information measures in aphasia. *International Journal of Language & Communication Disorders*, *52*(6), 689-732.

Rohde, A., Worrall, L., Godecke, E., O'Halloran, R., Farrell, A., & Massey, M. (2018). Diagnosis of aphasia in stroke populations: A systematic review of language tests. *PloS one*, *13*(3).

Simmons-Mackie, N., Threats, T. T., & Kagan, A. (2005). Outcome assessment in aphasia: A survey. *Journal of communication disorders*, *38*(1), 1-27.

Tsoi, K. K., Chan, J. Y., Hirai, H. W., Wong, S. Y., & Kwok, T. C. (2015). Cognitive tests to detect dementia: a systematic review and meta-analysis. *JAMA internal medicine*, *175*(9), 1450-1458.

Wallace, S. J., Worrall, L., Rose, T., & Le Dorze, G. (2017). Which treatment outcomes are most important to aphasia clinicians and managers? An international e-Delphi consensus study. *Aphasiology*, *31*(6), 643-673.

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- Stein-Rubin, C., & Fabus, R. (2011). *A guide to clinical assessment and professional report writing in speech-language pathology*. Nelson Education.

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- Spreen, O., & Risser, A. H. (2003). *Assessment of aphasia*. Oxford University Press.

- Whitworth, A., Webster, J., & Howard, D. (2014). *A cognitive neuropsychological approach to assessment and intervention in aphasia: A clinician's guide*. Psychology Press.

Assessment Goals:

2. Comprehensive

|		
Hearing	**Swallowing**	**Speech**

Language
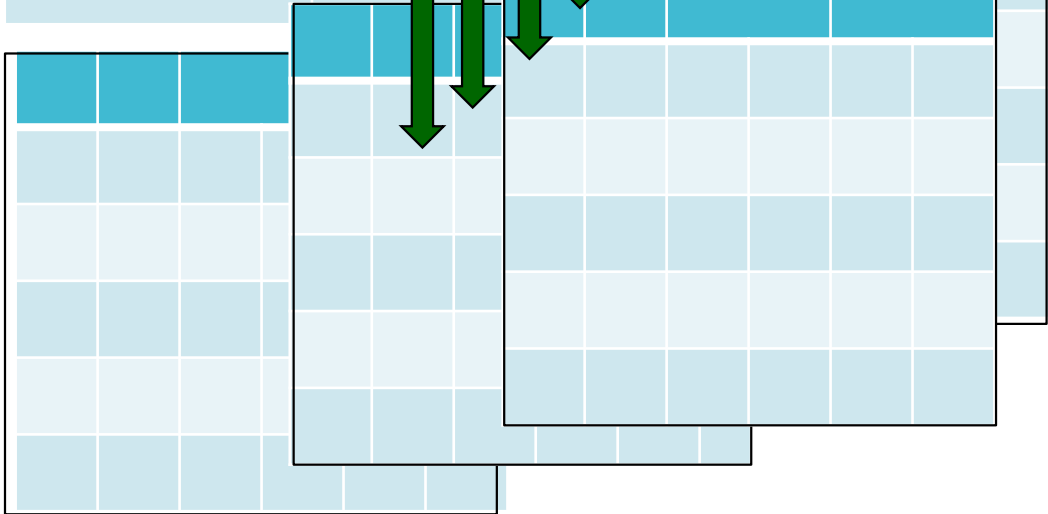- Auditory Comprehension
- Spoken Language
- Reading
- Writing

Other Cognitive Domains
- Orientation
- Attention
- Memory
- Problem Solving

Assessment Goals:

2. Comprehensive

Hearing	Swallowing	Speech

Language
- Auditory Comprehension
- Spoken Language
- Reading
- Writing

Other Cognitive
- Orientation
- Attention
- Memory
- Problem Solving
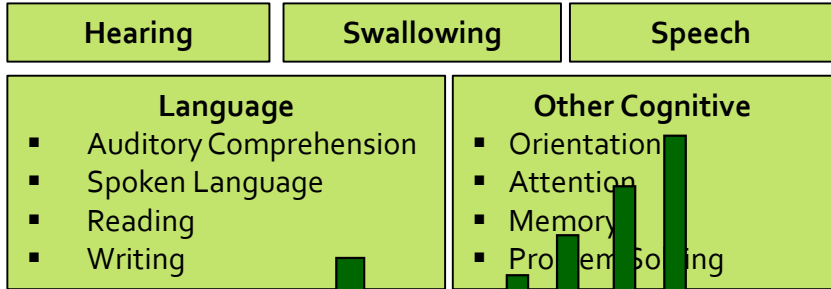
	Spoken Language		Written Language	
	Comprehension	Production	Reading	Writing
Sounds				
Words				
Sentences				
Discourse				

Assessment Goals & Challenges:
Comprehensiveness

Is there a challenge here?
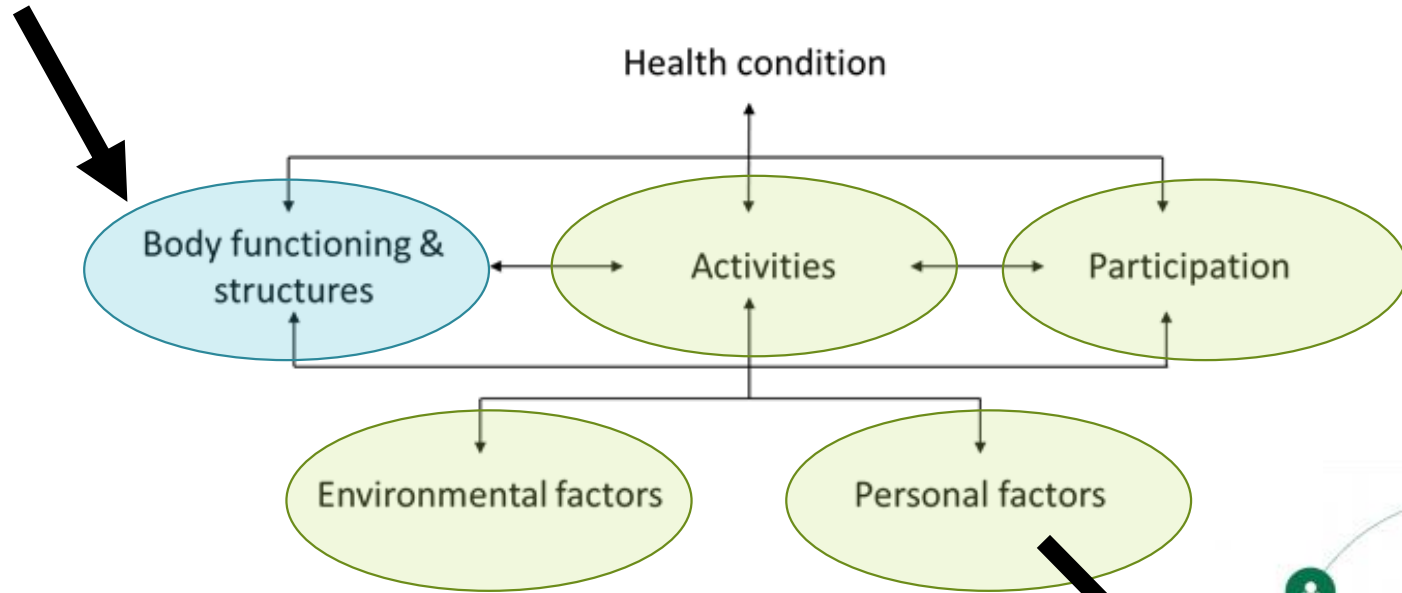
Presentation Outline

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Brief Measures of Cognition & Communication

❑ **Mini-Mental State Exam** (MMSE, Folstein, Folstein, & McHugh, 1975)

❑ **Montreal Cognitive Assessment** (MOCA, Nasreddine et al., 2005)

❑ **Cognitive Linguistic Quick Test** (Helm-Estabrooks, 2001)

❑ **Wechsler Abbreviated Scale of Intelligence** (Wechsler, 1999)

❑ **Repeatable Battery for the Assessment of Neuropsychological Status** (Randolph, 2001)

❑ **Microcog** (Powell, Kaplan, Whitla, Weintraub, Catlin, & Funkenstein, 1993)

❑ **Middlesex Elderly Assessment of Mental Status** (MEAMS, Golding, 1989)

Quick Tests & Screens: Comparison of content coverage and administration times

	WASI	Micro	RBANS	MEAMS	Cognist	CLQT	MMSE	SCCAN
Speech Comprehension								
Single Words	-	-	-	+	-	-	-	+
Connected Speech	-	-	-	-	+	+	+	+
Oral Expression								
Repetition	-	-	-	-	+	-	+	+
Naming	+	-	+	+	+	+	+	+
Connected Speech	-	-	-	-	+	+	-	+
Reading								
Single Words	-	-	-	-	-	-	-	+
Connected Text	-	-	-	-	-	-	+	+
Writing								
Single Words	-	-	-	-	-	-	-	+
Connected Text	-	-	-	-	-	-	+	+
Orientation	-	-	-	-	+	+	+	+
Attention								
Verbal	-	+	+	-	+	+	+	+
Visuo-spatial	-	+	-	-	-	+	-	+
Memory								
Verbal	-	+	+	+	+	+	+	+
Visuo-spatial	-	-	+	+	-	+	-	+
Problem Solving								
Verbal	+	+	-	-	+	+	-	+
Visuo-spatial	+	+	+	+	+	+	+	+
Numeric	-	+	-	+	+	-	+	+
Administration Time[a] (minutes)	30	30-45	30	10	20-30	15-30	5-10	30-40

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1. Assessment of communication and cognition: goals, priorities, & challenges
2. Brief measures of cognition and communication
3. Psychometric properties of the SCCAN:
   Goals & Design
   Reliability & Validity
4. Administration procedures
5. Applications across the continuum of care

SCCAN: Goals

1. Provide a broad overview of cognitive and communication functions for a wide range of patients

2. Allow rapid and *flexible* test administration (approximately 35 minutes)

3. Provide information about impairment & function

DESIGN

Goal 1: Provide an overview of cognitive and communication functions for a wide range of patients

The SCCAN includes Eight measuresment scales

1. Auditory Comprehension
2. Oral Expression
3. Reading
4. Writing
5. Orientation
6. Attention
7. Memory
8. Problem Solving

Comprehensiveness: Content Areas

Auditory Comprehension (15)
Oral Expression (19)
Reading (12)
Writing (8)
Orientation (12)
Attention (16)
Memory (21)
Problem Solving (25)
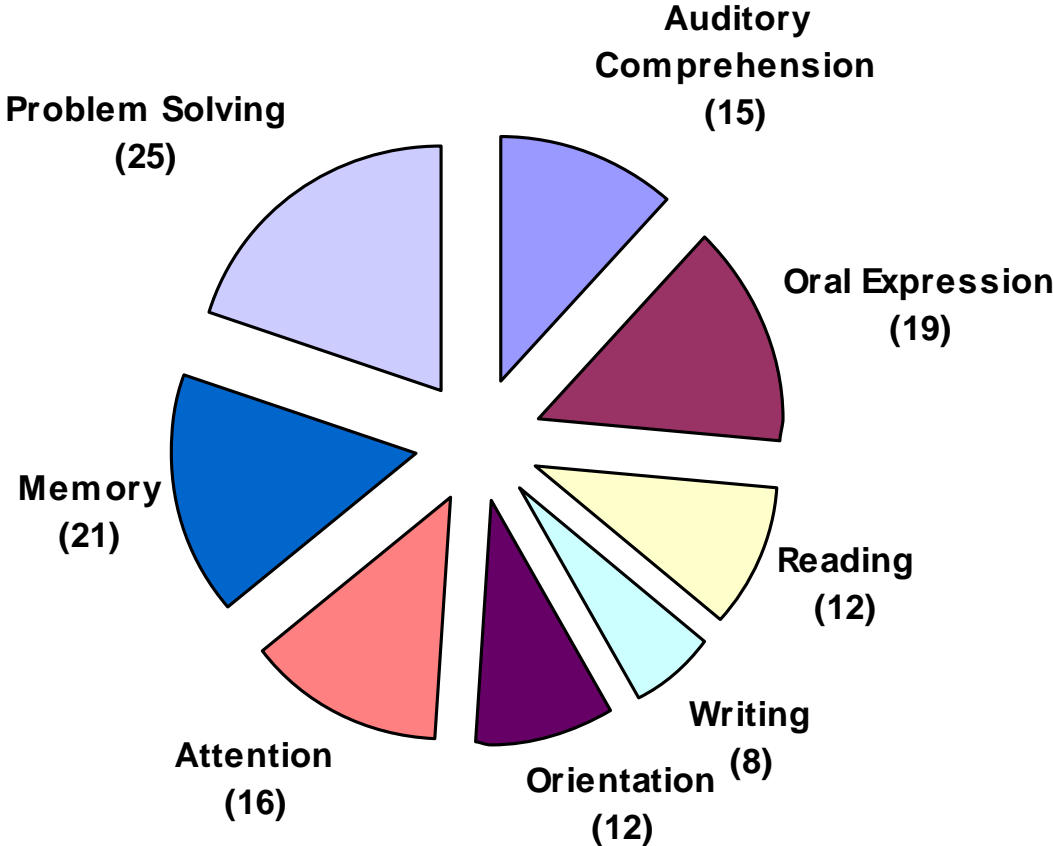
Comprehensiveness: Content Areas

Auditory Comprehension
Isolated vocabulary
Directives
Sentences/Questions
Discourse
Nonliteral Meaning

Oral Expression
Repetition
Automatic Speech
Answering Questions
Naming
Sentence Level Syntax
Discourse

Reading
Maps, Signs, Numbers
Single Word
Phrase & Sentence Level
Paragraph
Scanning verbal information

Writing
Copy
Personal Information
Word
Sentence

Comprehensiveness: Content Areas

Orientation

Person

Time

Place

Situation

Memory

Immediate recall

Delayed recall

New learning

Prospective

Attention

Sustained

Capacity/Span

Mental control

Problem Solving

Functional/Concrete

Semantic Categories

Sequential Reasoning

Numeric

Single & Multi-step

Comprehensiveness: Presentation technique
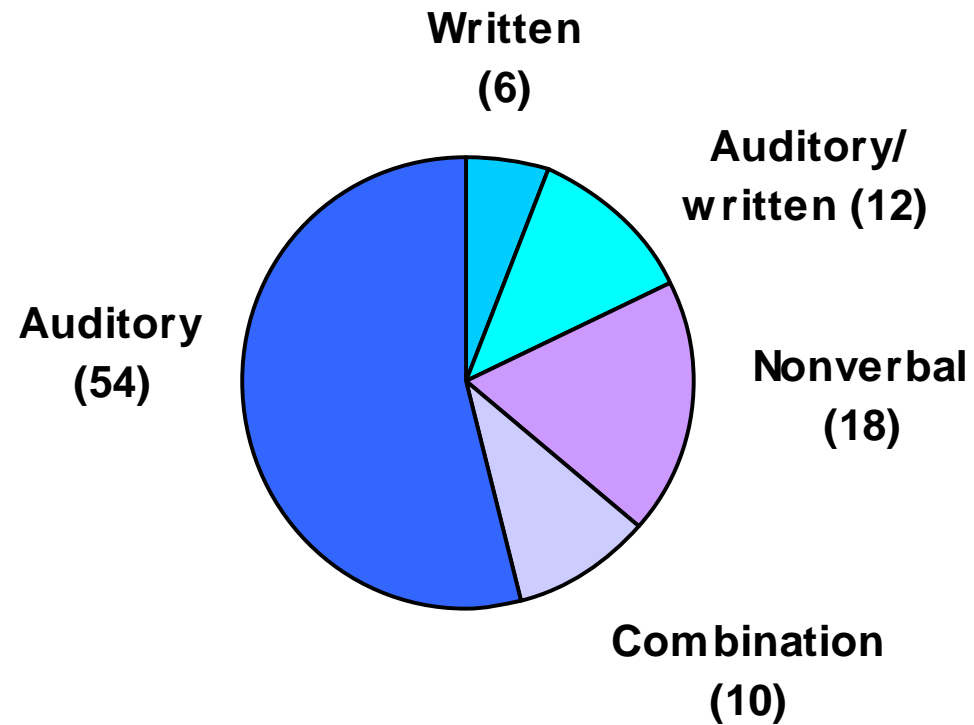
DESIGN:
Goal 2: Allow rapid and flexible test administration

Item Response Theory (IRT) used to develop SCCAN scales

➢ Items in each scale span a wide range of difficulty

➢ Items are ordered sequentially by difficulty level

➢ *Allows adaptive testing that is specifically tailored to the clinical profiles and ability levels of individual patients*

IRT Applications

Educational Tests

- **Scholastic Aptitude Test (SAT, College Board, 2010)**
- **Graduate Requirement Exam (GRE, Briel, O'Neill, & Scheuneman, 1993)**
- **Medical College Aptitude Test (MCAT, Koenig, 1998)**

Neuropsychological Tests

- **Wechler Adult Intelligence Scales (WAIS, Wechsler, 1997)**
- **Wechsler Memory Scales (WMS, Wechsler, 1997)**

IRT Applications:
Adult Language Disorders

Evaluation & Development of Existing Tests

- Revised Token Test (Hula, Doyle, McNeil, & Mikolic, 2006)
- ASHA FACS (Donovan, Rosenbek, Ketterson, & Velozo, 2006)

Development of New Tests & Measures

- Functional Independence Measurement Scales (Granger, Hamilton, Linacre, Heinemann, & Wright, 1993)
- Burden of Stroke Scale (Doyle, Matthews, Mikolic, Hula, McNeil, 2006)
- Scales of Cognitive and Communicative Ability for NeuroRehabilitation (Milman & Holland, 2008)
- Discourse Analysis (Milman, Dickey & Thompson, 2008)

Why IRT?

1. Measurement scales quantify patient performance

2. Measurement scales quantify item difficulty

3. Links measurement of person ability & item difficulty

Example of IRT SCCAN Scale: Writing

1. Copy circle
2. Copy first letter of name
3. Copy name
➢4. Write name
5. Single word to dictation: Dog
6. Short phrase to dictation
7. Single word to dictation: Photography
8. Written picture description

DESIGN: Goal 3:
Measuring Impairment & Function

➢ *Inserting functional items into an impairment based framework...*

DESIGN: Measuring Impairment & Function

Repetition Items
(from oral expression scale)

1. Ah

2. No

➢ 3. Examiner's name

4. Aspirin, Tums, Neosporin

5. Dr. White called to change your appointment from Wednesday at 9 to Wednesday at 11.

DESIGN: Measuring Impairment & Function

➢ *Inserting functional items into an impairment based framework...*

Table 6.1
Examples of Using Functional Items in an Impairment-Based Framework

Cognitive area/impairment	Example of functional item/activity
Oral Expression	Describing simple and complex daily activities
Orientation	Remembering one's own phone number
Memory	Recalling people, places, and medications
Speech Comprehension	Understanding words related to foods and everyday objects, understanding a simple phone message
Reading Comprehension	Reading signs, a menu, and a medication label
Writing	Writing one's own name, taking a message
Attention	Finding a location and route on a map
Problem Solving	Sequencing daily activities, adding bills, computing change

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Basic Psychometric Properties of the SCCAN:
References

➢ Milman, L. H. (2003). The Scales of Cognitive and Communicative Ability for Neurorehabilitation (SCCAN): Development and basic psychometric properties.

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➢ Milman, L. H., & Holland, A. L. (2012). *SCCAN: Scales of Cognitive and Communicative Ability for Neurorehabilitation*. Pro-Ed.

Methods: Subject Information Initial Study (n=91)

Subject Group	Age	Education	Time Post Onset (Range)	MMSE Score (Range)
Young Controls (20)	21 (19-23)	16		
Older Controls (20)	67 (56-86)	15		
Patients (51)	72 (34-91)	13	4 yrs 4 months (3 months to 12 yrs)	1-29/30
20 LH	71	14	4 yrs 2 months	3-28
15 RH	64	14	4 yrs 5 months	18-29
16 AD	80	12	4 yrs 6 months	1-26

Additional Normative Data (ProEd) Population (n=256)

Participant Group	N
Healthy Adults	109
Adults with neuropathology	147
LH Stroke	44
RH Stroke	35
AD	32
TBI	14
MS	12
Other	9

Methods: Procedures

Patients and Controls:

- To begin the test was administered using the decision tree, with tailored testing procedures

- Then all remaining items were administered

Patients:

- Completed a battery of cognitive-communicative tests to evaluate external validity

- To evaluate inter-rater reliability a second rater scored 10% of the patient tests

- The SCCAN was re-administered to the patient group after a delay of 7 days to assess test-retest reliability.

Psychometric Properties of the SCCAN: Results

I. Reliability (test-retest & split-half)

II. Reliability & Validity of IRT Scales

III. General Validity (external & practical)

Research Questions: Reliability

1. *Test-Retest Reliability:* *Are test scores stable across two separate administrations separated by one week?*

2. *Internal reliability:* *Does tailored test administration using the decision trees yield similar scores to administration of all items on the scales?*

1. Are scores stable across test administrations?

Test-retest Reliability for Patients (n=51)

Measure	Pearson r Correlation Coefficient
SCCAN Total Score	0.96
Auditory Comprehension	0.80
Oral Expression	0.95
Reading	0.86
Writing	0.78
Orientation	0.83
Attention	0.89
Memory	0.89
Problem Solving	0.90

2. Internal Reliability for Patients (n=51)

Do tailored and full test administrations yield comparable scores?

Measure	Pearson r Correlation Coefficient
SCCAN Total Score	0.99
Auditory Comprehension	0.99
Oral Expression	0.99
Reading	0.98
Writing	0.94
Orientation	0.97
Attention	0.98
Memory	0.99
Problem Solving	0.98

Research Questions: Reliability Summary (n=256)

Table 5.5
Summary of SCCAN Reliability Relative to Three Types of Reliability (Decimals Omitted)

	Type of reliability coefficient		
SCCAN value	Internal consistency	Test–retest	Scorer
SCCAN index	95	95	99
Sources of test error[a]	Content sampling	Time sampling	Interscorer differences

*These sources are from *Psychological Testing* (7th ed.), by A. Anastasi and S. Urbina, 1997, Upper Saddle River, NJ: Prentice Hall.

➢ *Interpretation:*

Reliability coefficients should be ≥ 90 when tests results are used to make important decisions
(Nunnaly & Bernstein, 94, Reynolds et al., 2009; Salvia et al., 2010)

Research Questions: Reliability & Validity of IRT Scales

3. **IRT Reliability:** *Is the order of item difficulty consistent across patients?*

4. **Content Validity:** *Does the difficulty level of test items capture the full range of patient abilities?*

5. **External validity:** *How do scores on IRT scales compare to scores on other measures of the same construct*

Results: IRT Analysis

Infinite ability

Individual Ability   Item Difficulty

5	5	*V*
4	4	*W*
3	3	*X*
2	2	*Y*
1	1	*Z*

No ability

3. IRT Reliability: Is the order of difficulty consistent across patients?

SCALE	IRT RELIABILITY
Auditory Comprehension	.92
Oral Expression	.96
Reading	.94
Writing	.95
Orientation	.87
Attention	.92
Memory	.92
Problem Solving	.94

4. Content Validity: Item Map of Auditory Comprehension Scale

Logit Scale	Patient ID	Item #
5	41 42 47 52 53 +	
		24
	24 25 32 33 43 44 50 55 62 64	
4	+	
3	21 23 39 45 46 49 51 63 69 70 +	
	31 48 61 73 74	23 32
2	M+	
	26 27 35 65 66 75 76	28
1	+	27
	22 54 68 72	29
		28
	30 36 71	
0	+M	
	34 40	
		21
	38	22
-1	+	31
	37 67	
	29	20 26 30
-2	+	19
-3	+	18
-4	+	25
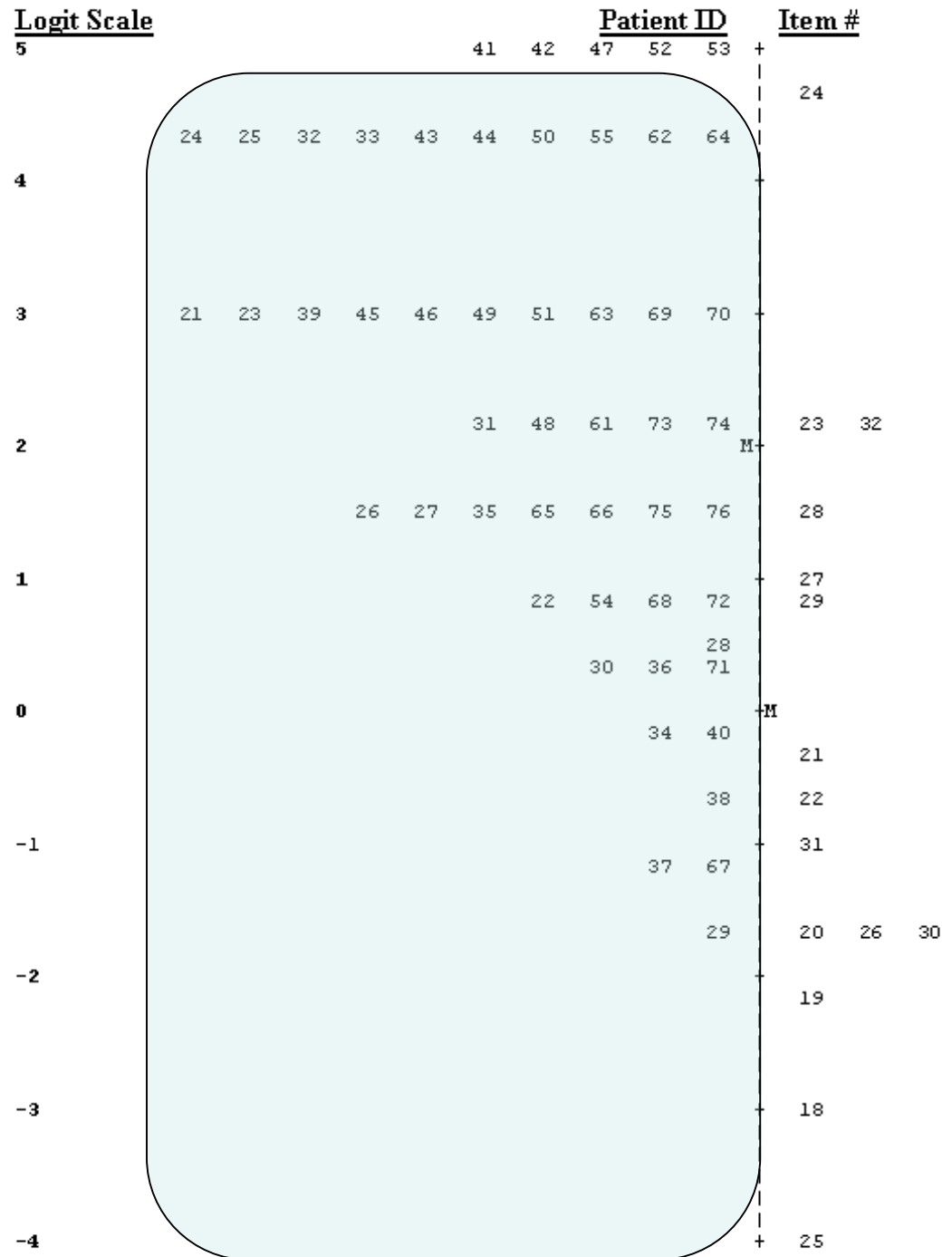
4. Content Validity: Item Map of Oral Expression Scale


```
Logit Scale              Patient ID        Item #
7                   42  44  47  52  +   45
                45  46  50  53  62  |
6                                   +
                                    |
5                   41  55  64  65  +   38
                                    |
            32  33  54  63  72  |
4                                   +
                                    |   37
        43  48  49  61  66  73  |       5
3                                   +
                    23  69  70  74  |   36
                                25  |
2                                   +
                    35  51  75 M|       44
                                    |   43  46
                        27  36  |       4
1                                   +   35  42
                        24  71  |
                                68  |
0                                  +M   41
                                38  |
-1                                  +
        21  34  39  67  76  |
                                    |   33
-2                                  +
                        31  40  |
-3                      28  29  30  +   34
                                    |
-4                                  +   3
                                    |   40
                        22  26  |
-5                                  +
                                    |   1   2
-6                                  +
                                    |   39
                                37  |
-7                                  +
```

4. Content Validity: Item Map of Reading Scale

Logit Scale						Patient ID		Item #	
5						32	62 +		
4				23	36	41	43	44 +	
									78
3				24	25	39	47	64	70 +
									75
					45	50	53	65	80
2								+	
	27	35	42	46	52	55	63	66	69	71	74	79
									77
1						33	61	74	75 M+
						26	28	51	68	76
0								+M	
						30	31	49	72	76
-1								+	
				21	22	38	48	54	73	71
									73
-2								+	
					29	34	37	67	72
-3								+	
-4								+	70
								40	69
-5								+	

Logit Scale

	Patient ID	Item #
5	47 62 63 +	
		88
4	32 33 41 43 44 45 50 51 53 61 65 66 69 70 71 +	
		86
3	+	
	23 25 27 39 46 54 64 72	
2	+	
	M|	
1	+	87
	24 28 30 31 35 36 40 42 48 49 52 55 74 75	
0	+M	
-1	+	
	21 22 37 67 73 76	
		85
-2	+	
		83 84
	26 29 34 38	
-3	+	
		82
	68	
-4	+	81
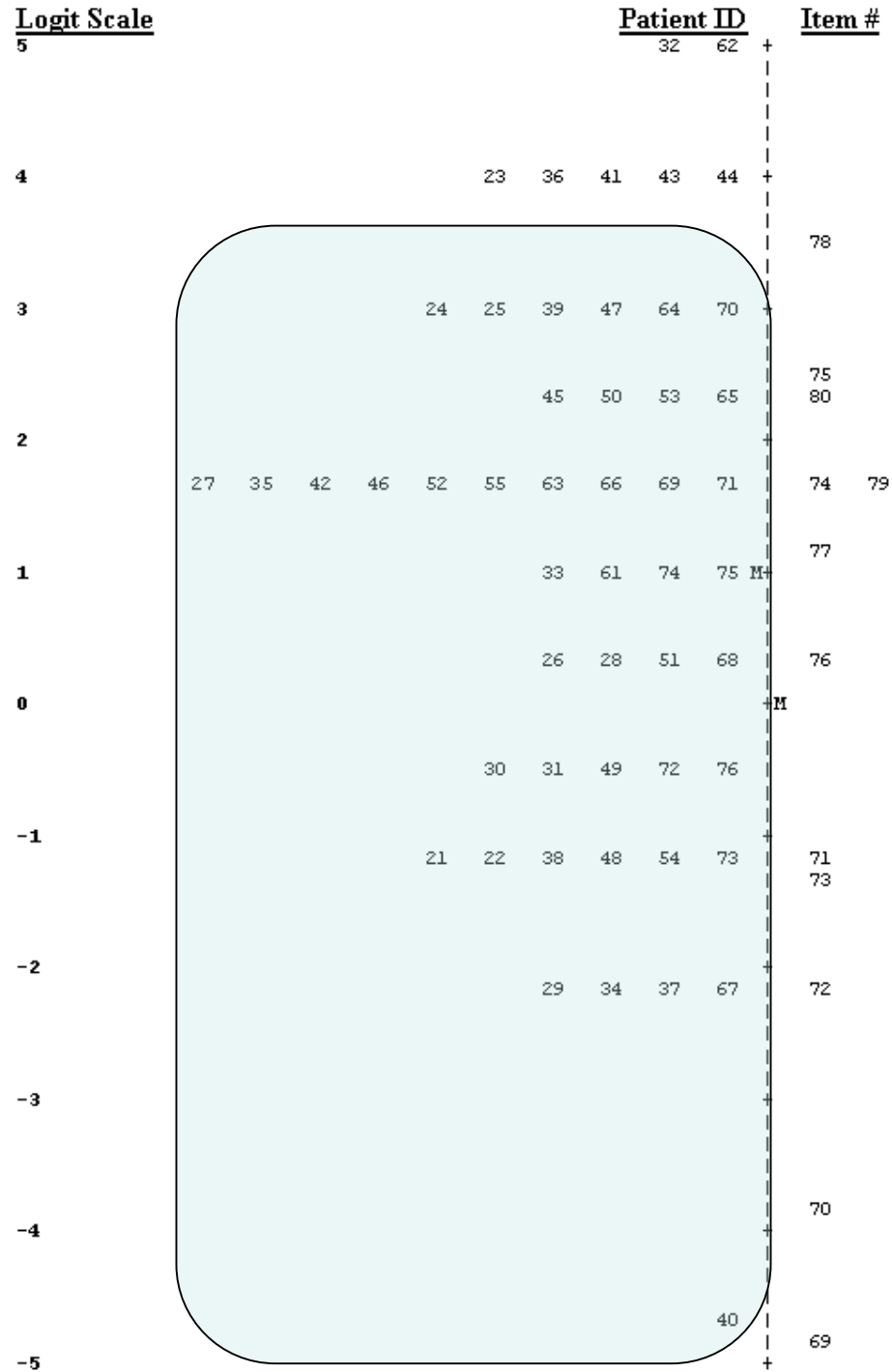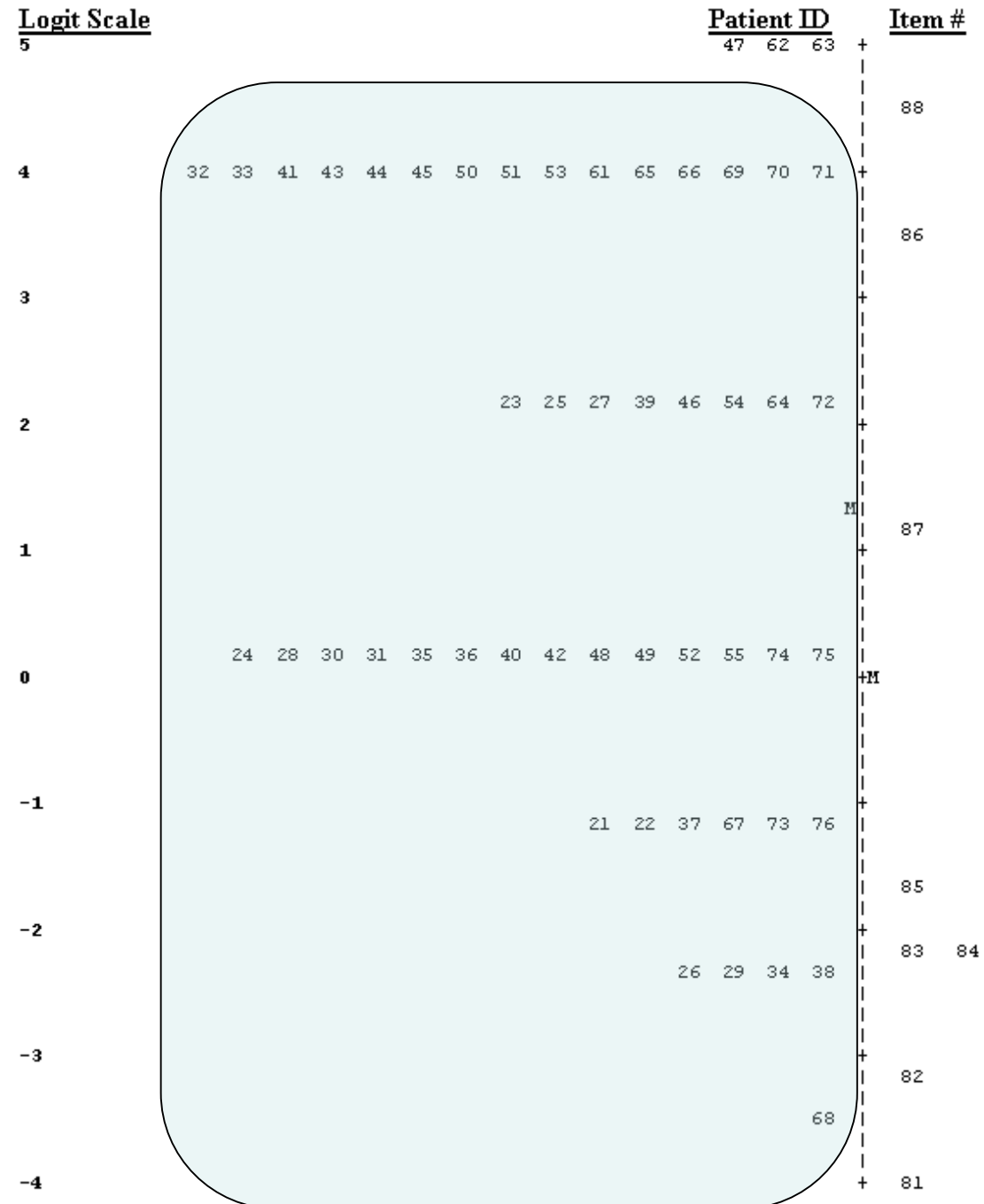
4. Content Validity: Item Map of Orientation Scale

```
Logit Scale                                          Patient ID        Item #
3          24   27   28   32   33   35   36   41   42   43   44   47   52  +
                23   25        38   39   45   46   48   53   62   70  |
                                                                     |        10


2                                                                    +
                29   30   31   40   50   51   54   63   72   73   74  |

                                                                    M|
                                                    21   22   55  |
1                                                                    +   15    9

                                                                     |        16
                                          34   65   69   75  |        17

                                                                     |
                          26   49   64   67   71   76  |M            8
0                                                                   +M   14

                                                          68  |
                                                37   66  |

                                                                     |
-1                                                                   +   13

                                                                     |
                                                                     |
                                                                     |        11

                                                          61  |
-2                                                                   +

                                                                     |
                                                                     |
                                                                     |
                                                                     |
-3                                                                   +   12    6    7
```
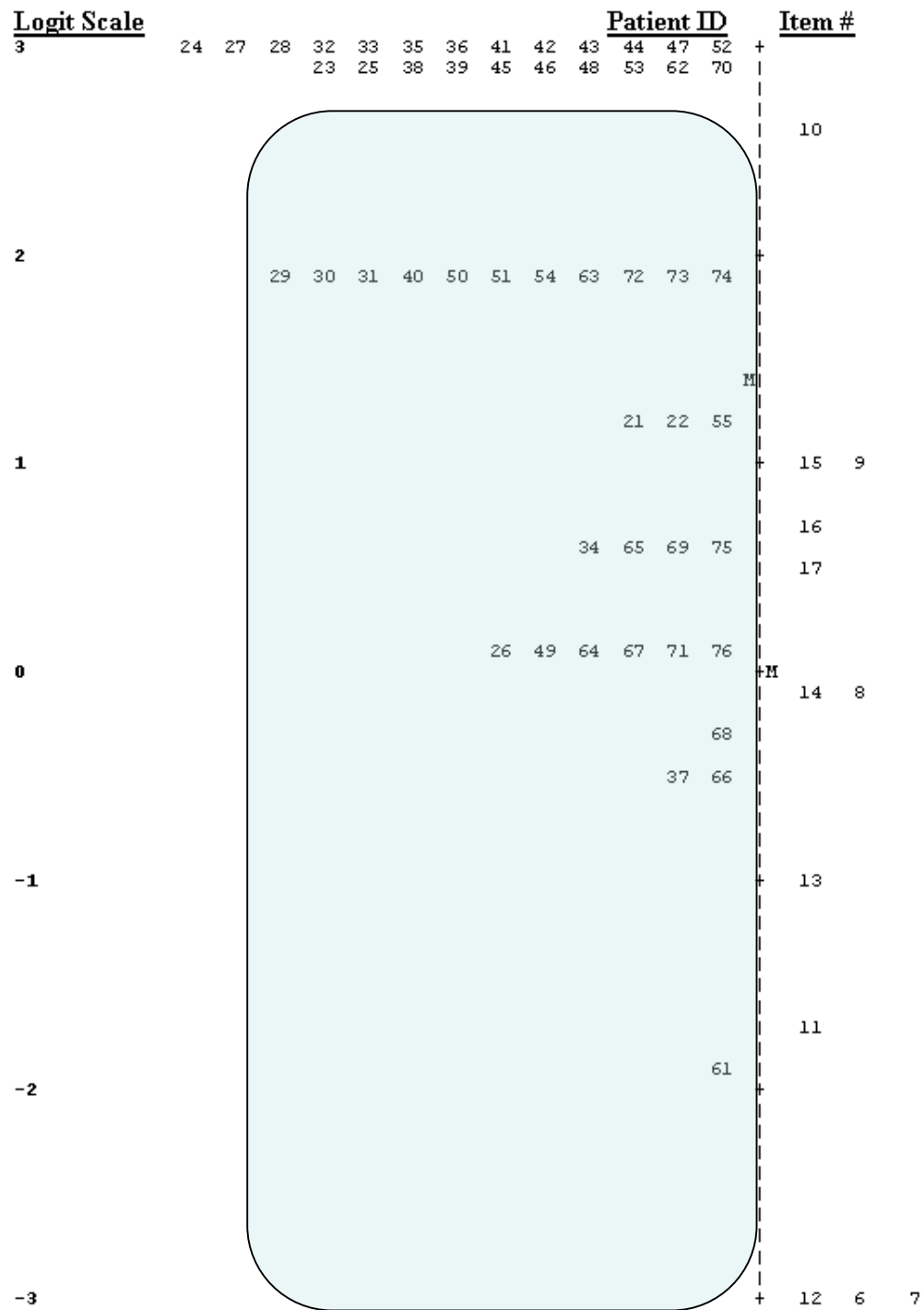
4. **Content Validity: Item Map of Attention Scale**

Logit Scale	Patient ID	Item #
4		61
	47 50	
3		
		58
	32 41 42	
2		
	23 25 43 44 52 70	
		50
	45 53 62	
		68
		57 80
1	24 35	
		38
	33 36 63	
	27 46 65	56
0	M+M	37
	39 51 64 73	75
	30 55 61 69	
		52
	28 48 71 72	55 83
-1	37	4
	34 40 49 54 66 74 75	
	26 31 38 68 76	
-2		
		76
	22 29	
		53
-3		
		21
-4		67

Logit Scale						Patient ID		Item #		
4						23	52	+		
								|		
								|		
								|	95	98
3								+		
								|		
						45	50	|		
								|		
2					43	47	55	+		
								|		
						41		|	97	
					25	42	53	|		
1								+	92	
				24	33	44	51	|		
								|	5	96
				31	40	46		|	99	
			30	35	36	38	73	|	93	
0	21	27	28	39	62		72	M|M	100	94
								|	32	51
				32	54	70		|		
				34	63	71		|	49	50
								|	4	90	91
		22	37	48	49	69		|		
-1								+		
				26	65			|		
			29	66	67	75		|	89	
								|		
				64	74			|		
-2								+		
								|		
				61	68			|		
								|		
-3								+		
								|	3	
								|	48	
								|		
-4					76			+		
								|		
								|		
								|		
-5								+	47	
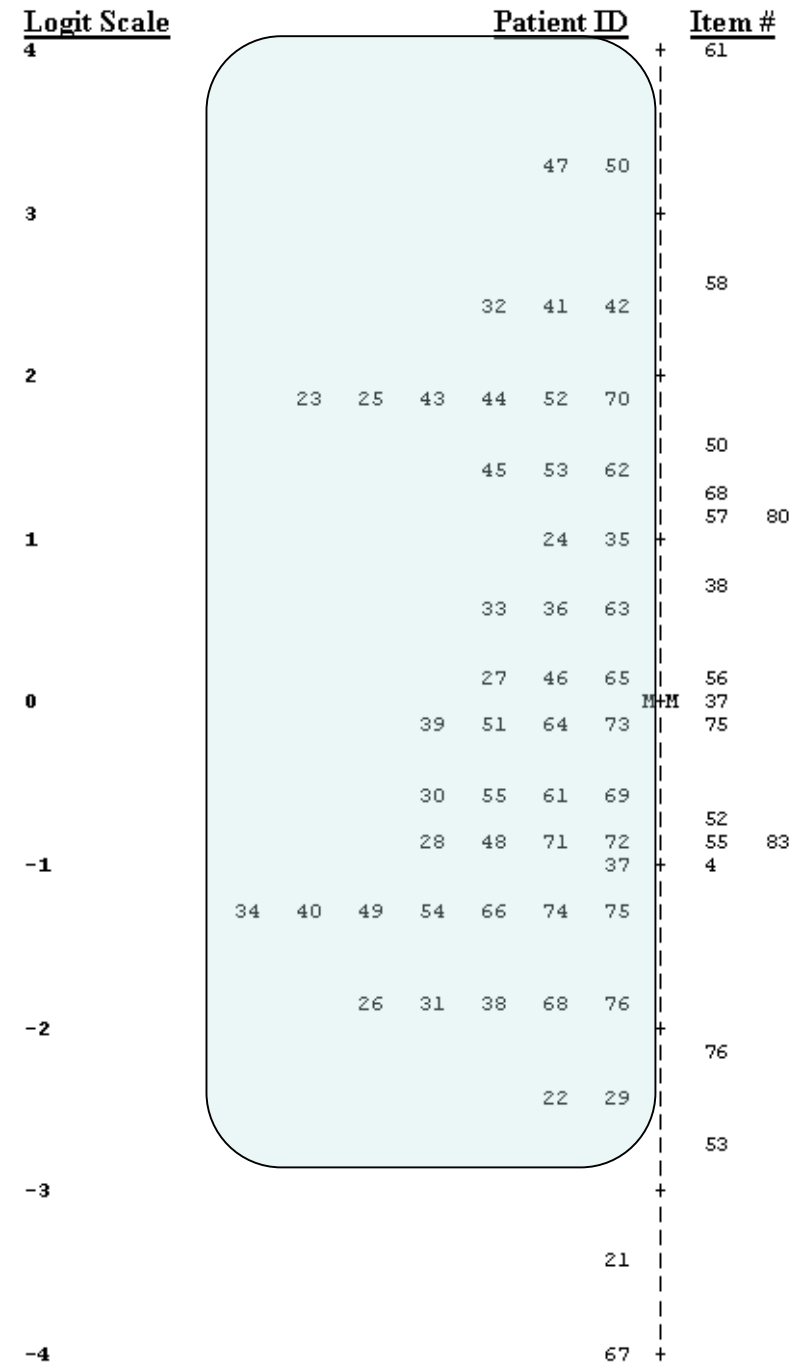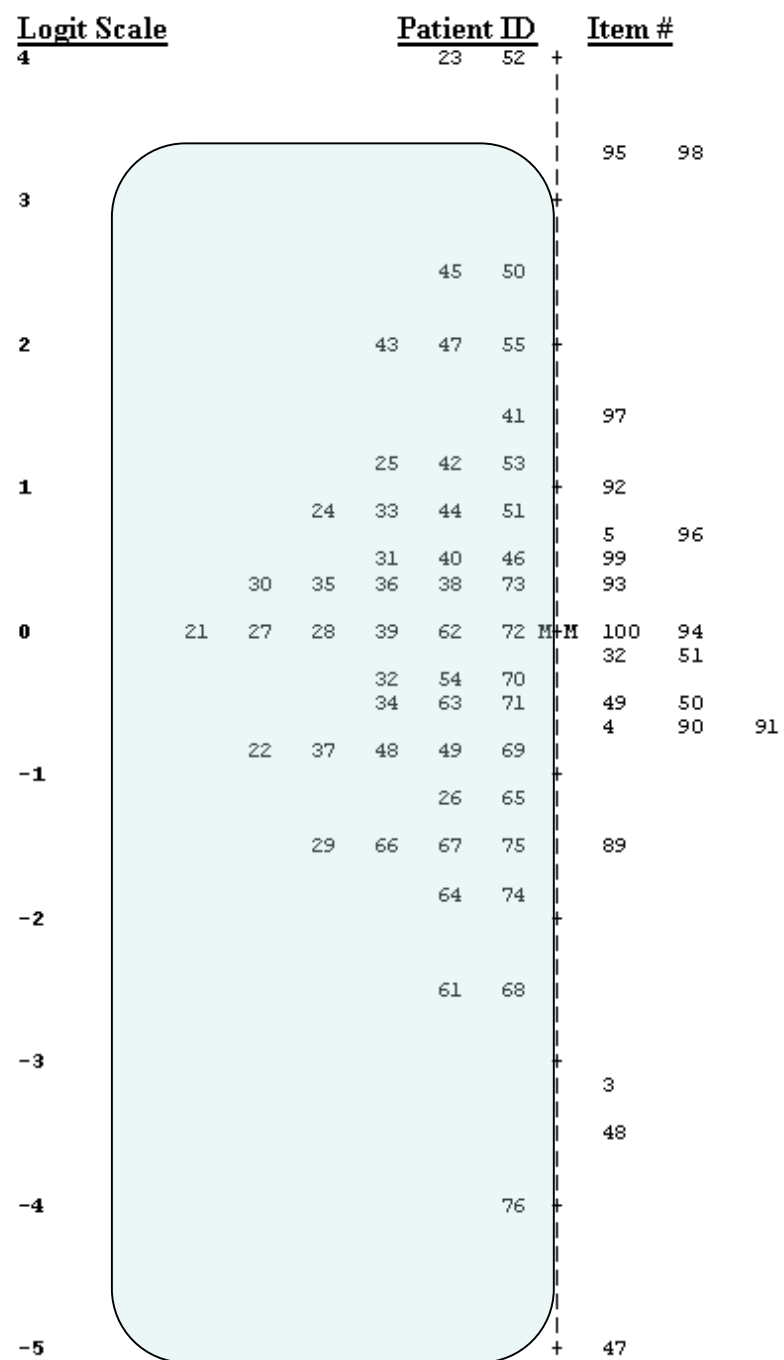
4. Content Validity: Item Map of Problem Solving Scale
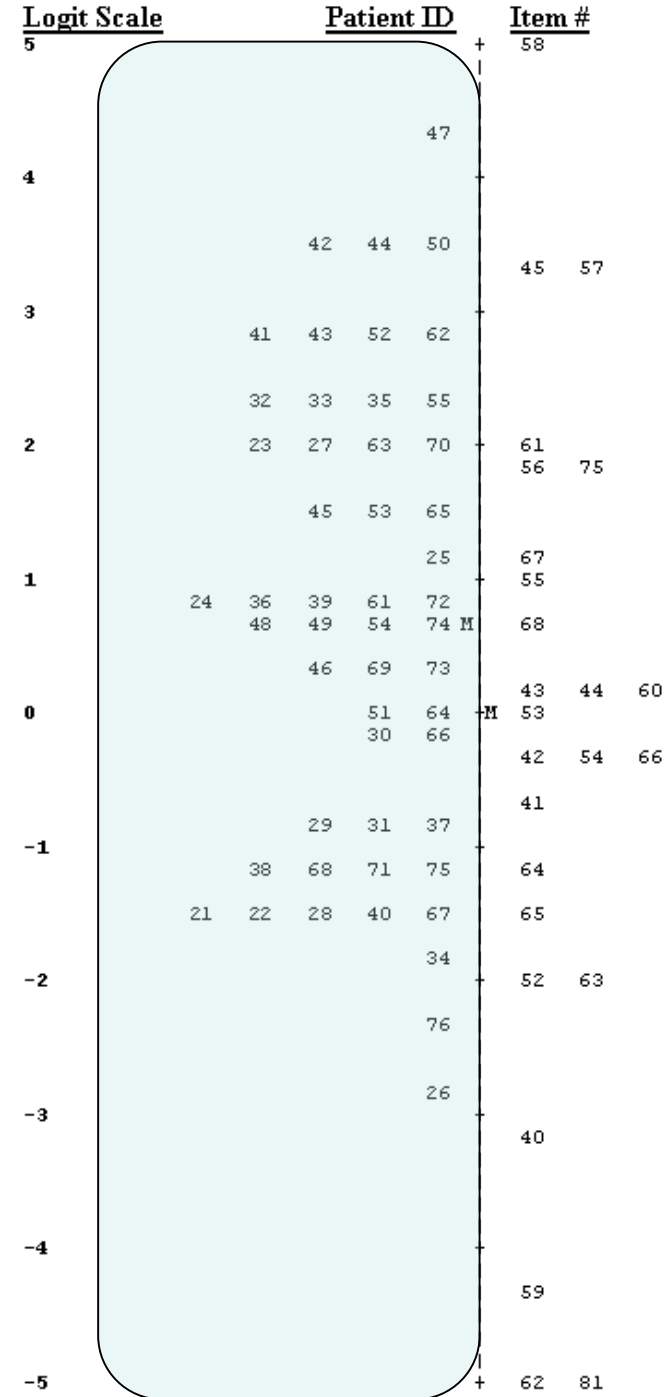
Research Questions:

5. How do scores on IRT scales compare to other measures?

Table 6.3
Corrected (and Uncorrected) Correlations Between the SCCAN and Criterion Measures (Decimals Omitted)

Criterion test	Test score	$(r_u)\ r_c$	Magnitude[a]
MMSE	Overall score	(89) 98**	Very large
SCCAN	Total raw score		
CADL-2	Total score	(92) 95**	Very large
SCCAN	Total raw score		
WAB	Oral Expression subtests total	(88) 92**	Very large
SCCAN	Oral Expression scale score		
WAB	Auditory Comprehension score	(79) 83**	Very large
SCCAN	Speech Comprehension scale score		
WAB	Reading Sentences subtest score	(71) 74**	Very large
SCCAN	Reading Comprehension scale score		
WAB	Written Picture Description score	(70) 73**	Very large
SCCAN	Writing scale score		
WAIS-III	Picture Arrangement subtest raw score	(42) 44*	Moderate
SCCAN	Problem Solving scale score		
CTT	Color Trails 1 time (seconds)	(—71) —89**	Very large
SCCAN	Attention scale score		
WMS-III	Logical Memory I and II, Faces I and II, and Spatial Span subtests raw total	(71) 79**	Very large
SCCAN	Memory scale score		

[a]Magnitudes of the corrected correlation coefficients are based on Hopkins's (2002) criteria.

*p < .01. **p < .0001.

Research Questions: General Validity

6. *Sensitivity, Specificity, & Differential Diagnoses:*
   Can the SCCAN differentiate impairment patterns of different clinical groups?

7. *Practical Validity:*
   How long does it take to administer the SCCAN?

6. General Validity: Sensitivity & Specificity (n=109)
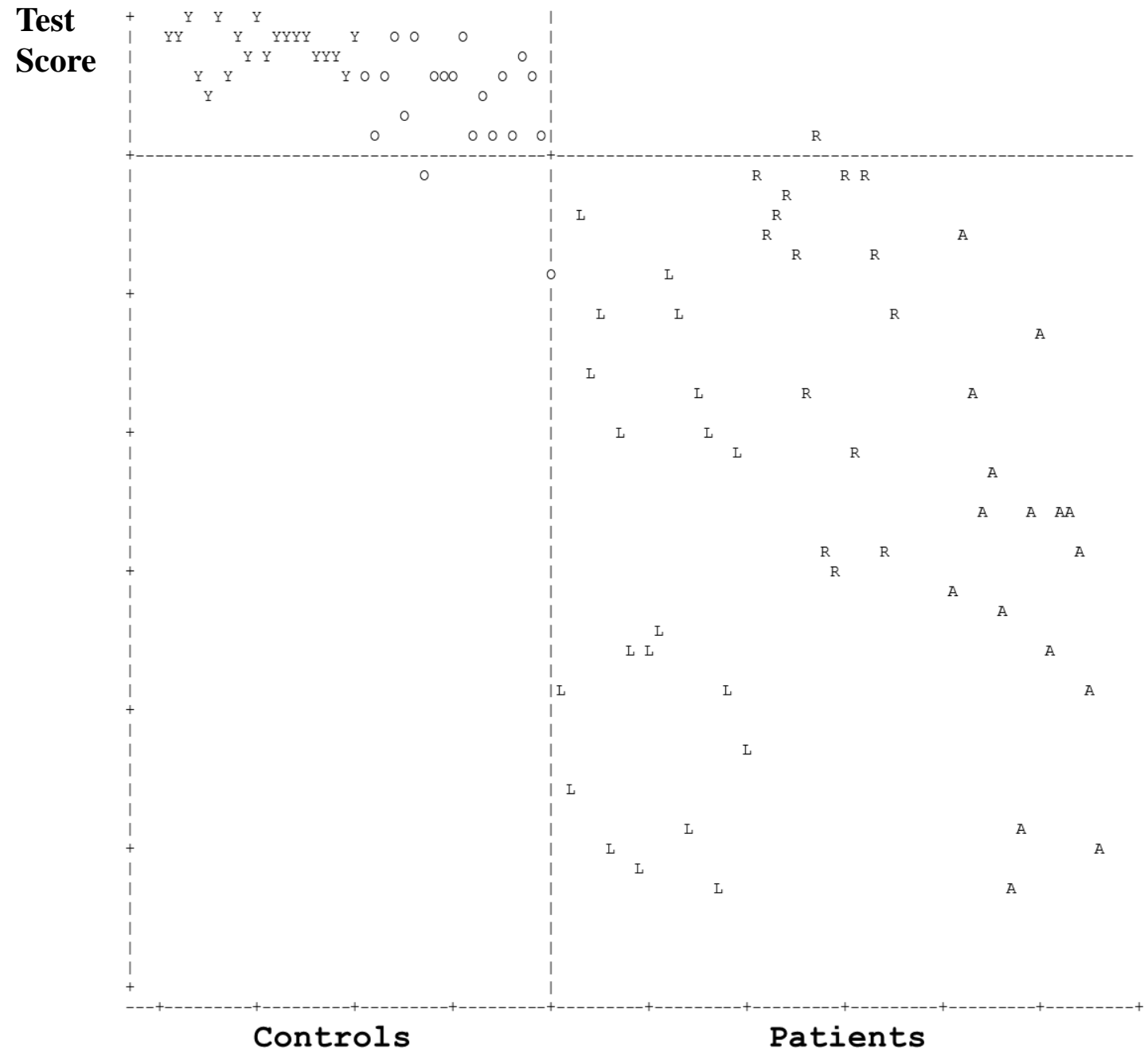
6. General Validity: Sensitivity & Specificity (n=256)

Table 6.4
Classification Values for the SCCAN Using a Cut Score of 87

Cut score	%ile Rank	N	ROC/ AUC	Sensitivity	Specificity	True positives	False positives	True negatives	False negatives	Classification accuracy
87	25	256	.96	.95	.81	140	21	88	7	.89

Note. ROC/AUC = Area under the receiver operating characteristic curve.

➢ *Interpretation:*

Using a cut-off score of ≥ 87 accurately classifies

95% of patients as having an impairment

81% of healthy controls as being unimpaired

➢ *Interpretation of ROC values (Compton et al., 2006):*

Excellent ≥ 90

Good = 80 -89

Fair = 70-79

Poor < 70

6. General Validity: Differential Diagnosis

Do the scales differentiate patient groups? (n=51)

7. Practical Validity:
Administration Time (minutes)

Subject Group	Tailored Testing	Full Test	Time Saved
All Patients (51)	34	47	13
LH Group (20)	34	49	15
RH Group (15)	31	40	9
AD Group (16)	38	50	12

7. Practical Validity:
Administration Time (minutes)

Time saved as a function of patient ability level (n=51)
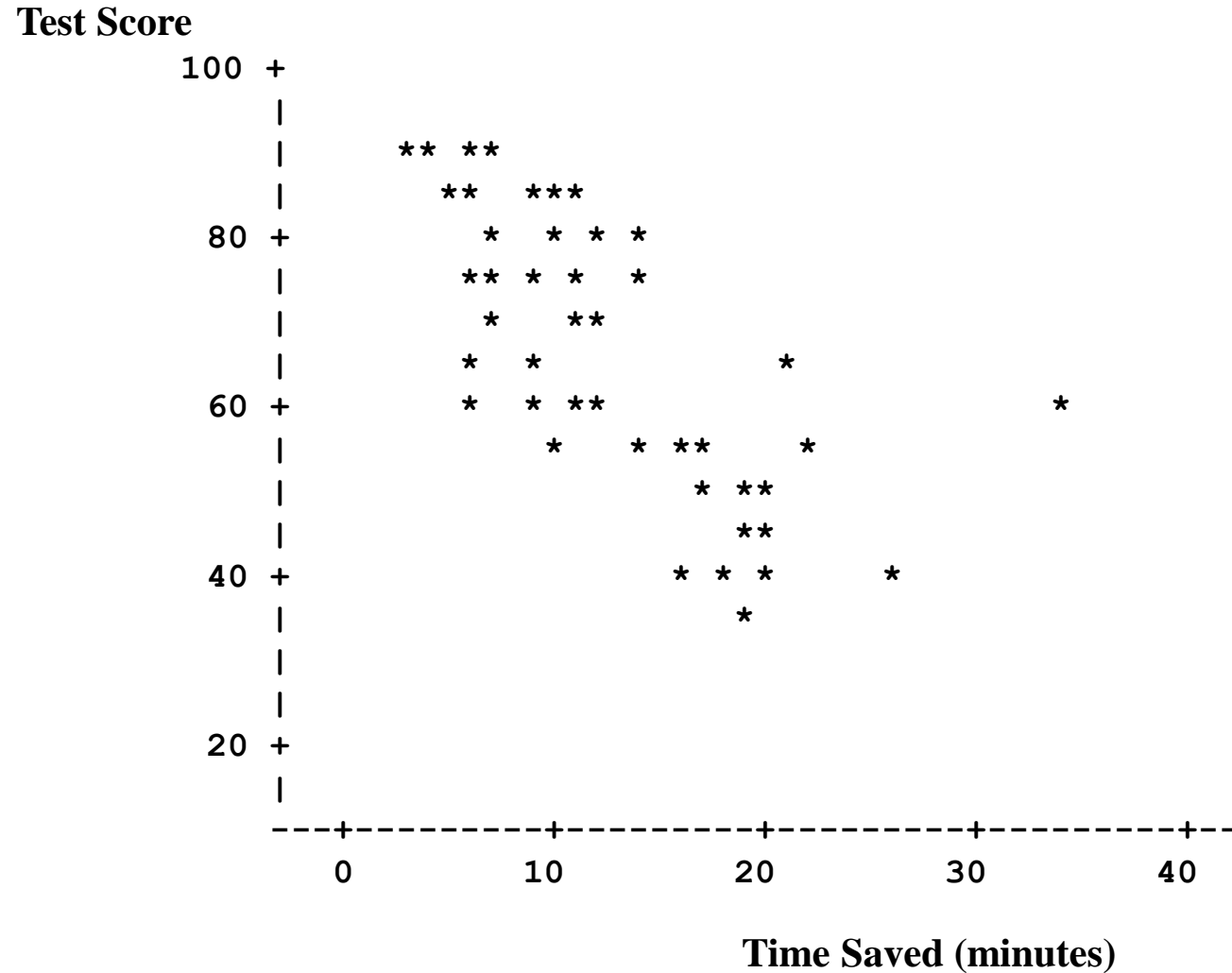
Psychometric Properties of the SCCAN: **Summary**

I. **Reliability:**
  - ≥ .90 for total SCCAN score across multiple correlation coefficients

II. **Reliability & Validity of IRT** Scales
  - The order of item difficulty was highly consistent across patients (r: 87-96)
  - Item maps (item difficulty) captured a wide range of patient ability levels
  - Correlations with similar measures ranged from moderate-very large

III. **General Validity (external & practical)**
  - A cut-off score of 87/94 resulted in an overall classification accuracy of 89% (95% for patients; 81% for healthy controls)
  - Differentiated performance patterns of three clinical groups
  - Mean administration time was 34 minutes

Presentation Outline

1. Assessment of communication and cognition: goals, priorities, & challenges
2. Brief measures of cognition and communication
3. Psychometric properties of the SCCAN
4. Administration procedures
5. Applications across the continuum of care

Clinical Applications

➢Identify/screen patients for cognitive-communicative impairments

➢Estimate level of impairment

➢Assist with differential diagnosis

➢Describe qualitative aspects of impairment & everyday functioning

➢Generate reports for case conferences/family counseling

➢Guide treatment & discharge planning

➢Monitor change for individual patients and clinical programs

Administration: Target Population
(standardization sample)

➢ Inclusionary Criteria
  ➢ Adults (18-95 years old)
  ➢ Native English speakers
  ➢ Premorbidly literate
  ➢ No prior history of language learning impairment
  ➢ Broad range of neurological impairments

➢ Exclusionary criteria:
  ➢ Profound sensory/motor impairments

Administration: Before giving the test…

➢ Examiner Qualifications: The SCCAN should be administered by individuals who have had professional training in cognitive assessment (e.g., licensed SLPs & psychologists)

➢ Familiarize yourself with administration and scoring procedures

➢ Complete medical history

➢ Ensure patient has normal assistive aids (dentures, eyeglasses, hearing aids)

Before giving the test... familiarize yourself with administration and scoring procedures.

Contents

Scales of Cognitive and Communicative Ability for Neurorehabilitation

SCCAN

Lisa H. Milman
Audrey L. Holland

Examiner's Manual

Administration and scoring procedures: Overview

➢ **Entry points, Basals, & Ceilings**
  ➢ **Start at designated midpoint**
    ➢**If entry and/or subsequent item are missed: continue with initial items in scale and proceed forward until 2 items are missed**
    ➢**If entry and subsequent item are correct: continue forward until 2 consecutive items are missed**

1. Ah

2. No

➢ 3. Examiner's name

4. Aspirin, Tums, Neosporin

5. Dr. White called to change your appointment from Wednesday at 9 to Wednesday at 11.

Scales of Cognitive and Communicative Ability for Neurorehabilitation

SCCAN

Lisa H. Milman
Audrey L. Holland

Examiner's Manual

Part A. Oral Expression I: Repetition & Immediate Recall

PURPOSE: Measures Oral Expression (OE), Memory (ME), and Attention (AT)

CUES: Questions and instructions may be repeated once. Provide a second trial if word is repeated incorrectly.

SCORING: Because this section measures oral expression, an oral response is required. Examinees should not be penalized for dysarthric errors as long as speech is intelligible (at least 75% of phonemes correct). For items that require multiple responses, all responses must be correct to receive 1 point.

Item	Total raw score	OE score	ME score	AT score

1. **Please say what I say: "Ah."**

2. **Please say what I say: "No."**

3. **Entry point**

   Hello, my name is _____. I am a _____ (state your occupation—speech pathologist, psychologist, etc.). I am here to talk to you about talking, thinking, and remembering things. I have some questions for you, and some things that I want you to remember. The first thing that I am going to ask you to remember is my name. It's _____ (state your name). Do you remember what it is?

   CUE: If examinee does not respond, or says the wrong name, say **It's _____ (state your name). What's my name?**

   IF CORRECT, SAY: **OK, at the end of the test, I'll ask you my name, and you'll say it's _____ (state your name).**

4. **I'm going to read you a list of medications. When I finish, tell me as many of them as you remember. Ready? "Aspirin, Tums, Neosporin." Tell me as much of that list as you remember.**

   CUE: Provide a second trial if medications are omitted or repeated incorrectly.

   IF CORRECT, SAY: **Remember them, because I'm going to ask for them again.**

   SCORING: All three medications must be named.

5. **Now I am going to read you a message. When I finish, tell me as much of it as you remember. Ready?**
   "Dr. White called to change your appointment from Wednesday at 9 to Wednesday at 11."
   Tell me as much of that as you remember.

   CUE: Provide a second trial if message is repeated incorrectly.

   IF CORRECT, SAY: **Try to remember this message also. In a few minutes, I'll ask you for my name, the three medications, and the message.**

   SCORING: Response must include <u>all</u> of the following information. Check all that were correctly remembered:

_____ (a) Dr. White	_____ (e) Wednesday
_____ (b) called	_____ (f) 9
_____ (c) changed/switched/rescheduled	_____ (g) 11
_____ (d) appointment	

Totals for Page 2:

Administration and scoring procedures: Overview

General cues:

➤ Instructions may be repeated once

➤ Provide general feedback only (You've got the right idea, That was a hard one, You're doing fine, Almost done...)

➤ Unless otherwise specified allow 20 seconds for a response then say 'Lets try another one'

➤ Try to administer in one session when possible (standardized)

➤ If test is administered in two sessions complete:
  ➤ Session 1: pgs. 1-6 & pg. 14 section b (delayed verbal recall)
  ➤ Session 2: pg. 7-14 & pg. 14 section a only (delayed visual recall)

Administration and scoring procedures: Overview

Specific cues:

Part A. Oral Expression I: Repetition & Immediate Recall

PURPOSE: Measures Oral Expression (OE), Memory (ME), and Attention (AT)

CUES: Questions and instructions may be repeated once. Provide a second trial if word is repeated incorrectly.

SCORING: Because this section measures oral expression, an oral response is required. Examinees should not be penalized for dysarthric errors as long as speech is intelligible (at least 75% of phonemes correct). For items that require multiple responses, all responses must be correct to receive 1 point.

	Item	Total raw score		OE score	ME score	AT score
1.	Please say what I say: "Ah."	☐	➤	☐		
2.	Please say what I say: "No."	☐	➤	☐		
3.	Hello, my name is _____. I am a _____ (state your occupation—speech pathologist, psychologist, etc.). **I am here to talk to you about talking, thinking, and remembering things. I have some questions for you, and some things that I want you to remember. The first thing that I am going to ask you to remember is my name. It's** _____ (state your name). **Do you remember what it is?**					

Entry point

CUE: If examinee does not respond, or says the wrong name, say **It's** _____ (state your name). **What's my name?**

IF CORRECT, SAY: **OK, at the end of the test, I'll ask you my name, and you'll say it's** _____ (state your name).

☐	➤	☐	☐		

Administration and scoring procedures: Overview

Specific cues:

Part D. Oral Expression II: Naming

PURPOSE: Measures Oral Expression (OE) and Attention (AT)

CUES: If the examinee provides a correct but nonspecific response, such as *face* for *chin*, say, **That's right. Can you be more specific?** If the examinee describes items, say, **So, it's a . . . .** Do not provide additional cues.

SCORING: Score 1 point if examinee accurately and independently names items. Do not penalize examinees for dysarthric errors if speech is intelligible (at least 75% phonemes correct).

	Item	Total raw score		OE score	AT score
31.	Point to a table. **What is this called?** NOTE: If there is no table in the room, another common piece of furniture should be used.	☐	→	☐	
32.	Point to your chin. **What is this called?**	☐	→	☐	
33. Entry point	Now I have some different questions for you. **What animal looks like a horse but has black and white stripes?** SCORING: The only correct response is *zebra*.	☐	→	☐	
34.	**What is the name of a material used to package eggs?** SCORING: Acceptable responses are *Styrofoam*, *cardboard*, *plastic*, and *carton*.	☐	→	☐	
35.	⏰ **I'm going to give you 30 seconds to tell me as many animals as you can think of. Ready? Begin.** CUE: Clarify/repeat directions as needed. If examinee has difficulty getting started, say, **For example:** *lion.* If examinee stops early, say, **Try to think of some more.** Do not give additional cues. SCORING: Examinee must name at least eight animals to score 1 point. Do not count *lion* toward this score if it was used as an example.	☐	→	☐	☐
36.	⏰ **This time, I'll give you 30 seconds to tell me as many words as you can think of that start with the letter f. Ready? Begin.** CUE: If examinee has difficulty getting started, say, **For example:** *fan.* If examinee stops early, say, **Try to think of some more.** Do not give additional cues. SCORING: Examinee must name at least six words starting with the letter *f* to score 1 point. Do not count *fan* toward this score if it was used as an example.	☐	→	☐	☐
	Totals for Page 5:	☐		☐	☐

Administration and scoring procedures: Overview

General Scoring Rules:

➢ All items are given a score of:

  1 = Normal Performance

or

  0 < Normal Performance

   Inaccurate

   Incomplete/partial

   NR

Administration and scoring procedures: Overview

General Scoring Rules:

➢ Do not penalize for slang, dialect, or dysarthria so long as speech is intelligible (75% phonemes correct)

➢ When multiple responses are given, score the final response

Administration and scoring procedures: Overview

Specific scoring rules:

Part A. Oral Expression I: Repetition & Immediate Recall

PURPOSE: Measures Oral Expression (OE), Memory (ME), and Attention (AT)

CUES: Questions and instructions may be repeated once. Provide a second trial if word is repeated incorrectly.

SCORING: Because this section measures oral expression, an oral response is required. Examinees should not be penalized for dysarthric errors as long as speech is intelligible (at least 75% of phonemes correct). For items that require multiple responses, all responses must be correct to receive 1 point.

	Item	Total raw score	OE score	ME score	AT score
1.	Please say what I say: "Ah."	☐ ┈┈▶	☐		
2.	Please say what I say: "No."	☐ ┈┈▶	☐		
3.	**Entry point** Hello, my name is _____. I am a _____ (state your occupation—speech pathologist, psychologist, etc.). **I am here to talk to you about talking, thinking, and remembering things. I have some questions for you, and some things that I want you to remember. The first thing that I am going to ask you to remember is my name. It's _____** (state your name). **Do you remember what it is?**				
	CUE: If examinee does not respond, or says the wrong name, say **It's _____** (state your name). **What's my name?**				
	IF CORRECT, SAY: **OK, at the end of the test, I'll ask you my name, and you'll say it's _____** (state your name).	☐ ┈┈▶	☐	☐	
4.	**I'm going to read you a list of medications. When I finish, tell me as many of them as you remember. Ready? "Aspirin, Tums, Neosporin." Tell me as much of that list as you remember.**				
	CUE: Provide a second trial if medications are omitted or repeated incorrectly.				
	IF CORRECT, SAY: **Remember them, because I'm going to ask for them again.**				
	SCORING: All three medications must be named.	☐ ┈┈┈┈▶	☐	☐	☐
5.	**Now I am going to read you a message. When I finish, tell me as much of it as you remember. Ready?** "Dr. White called to change your appointment from Wednesday at 9 to Wednesday at 11." Tell me as much of that as you remember.				

Before giving the test…
Complete the medical history

Scales of Cognitive and Communicative Ability for Neurorehabilitation

SCCAN
Report Summary Form
Lisa H. Milman   Audrey L. Holland

Section 1. Identifying Information

Examinee's Name _____ Date of Birth _____ Age _____

☐ Male ☐ Female

Race: ☐ Asian ☐ African American ☐ American Indian/Eskimo/Aleut ☐ White ☐ Other

Ethnicity: ☐ Hispanic ☐ Not Hispanic

Date of Evaluation _____ Facility Name _____

Facility Address _____

Date of Admission to Facility _____

Examiner's Name _____ Title/Occupation _____

Section 2. Medical History

Medical Diagnosis _____ Date of Onset _____

Lesion Location/Description _____

  CAT Scan (date) _____ MRI Scan (date) _____

Past Medical History _____

Prior history of a neurologic/psychiatric disorder? ☐ Yes ☐ No

  Description _____

Prior history of a language/learning impairment? ☐ Yes ☐ No

  Description _____

Premorbid Handedness ☐ Right ☐ Left ☐ Ambidextrous

Is English adequate for testing? ☐ Yes ☐ No

  Dominant language is not English but _____

  Other languages _____

Uses ☐ Eyeglasses/contacts ☐ Hearing aid

Vision is adequate for testing, i.e., examinee is able to see small environmental objects, such as a ring, call button, coins.

  ☐ Yes ☐ No

Hearing is adequate for testing, i.e., examinee is able to hear a loud voice in a quiet environment.

  ☐ Yes ☐ No

Motor function is adequate for testing, i.e., examinee is able to hold a pencil.

  ☐ Yes ☐ No

Section 3. Social/Occupational History

Premorbid Functional Status _____

Premorbidly literate ☐ Yes ☐ No

Education (# of yrs.) _____ High school _____ College _____ Postgraduate _____

Current Living Arrangement _____ Alone _____ Other _____

Occupation _____

Section 4. Behavioral Observations

☐ behavior unremarkable   ☐ impulsive   ☐ confused
☐ somnolent   ☐ disinhibited   ☐ suspicious
☐ reduced affect   ☐ distractible   ☐ reduced insight
☐ reduced eye contact   ☐ perseveration   ☐ unconcerned
☐ reduced initiation   ☐ confabulation   ☐ labile
☐ increased response time   ☐ anxious   ☐ reduced frustration tolerance
☐ verbose   ☐ agitated   ☐ self-deprecating
☐ tangential   ☐ uncooperative   ☐ discouraged

Oral Expression

Speech production
☐ nonverbal/aphonic
☐ evidence of dysarthria/apraxia
☐ slow/press of speech
☐ effortful
☐ reduced intonation (flat affect)
☐ within normal limits (WNL)

Repetition adequate for
☐ isolated vowels
☐ words and sentences

Naming
☐ paraphasias (lexical/phonemic, neologisms)
☐ anomia
☐ accurate
☐ naming speed (word fluency) WNL

Connected speech primarily
☐ limited to automatic speech/social phrases
☐ limited to single words
☐ limited to short phrases
☐ limited to sentences
☐ discourse
☐ grammar
☐ content is meaningful and relevant

Conversational interaction
☐ communicates needs/preferences
☐ requests help/information
☐ refers to people by name
☐ initiates communication/changes topic
☐ recognizes/corrects speech errors
☐ participates fully in conversation

Comments: _____

2

Administration Materials

1. Examiner Record Booklet

2. Written Response Booklet

3. Stimulus Book

Scales of Cognitive and Communicative Ability for Neurorehabilitation

SCCAN

Lisa H. Milman
Audrey L. Holland

Stimulus Book
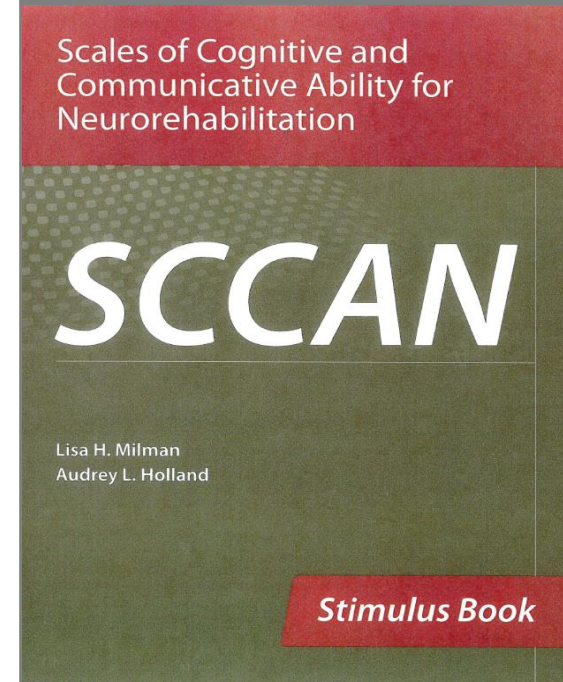
General Clinical Materials

4. Pencil/Pen

5. Clip board or flat surface for writing

6. Watch/clock with a second hand (or stop watch)

➤ **Ensure patient has normal assistive aids (dentures, eyeglasses, hearing aids)**

Demonstration:
SCCAN Administration

Case 1: Mild Impairment

Part A. Oral Expression I: Repetition & Immediate Recall

1. **Please say what I say: "Ah."**

   ☐

2. **Please say what I say: "No."**

   ☐

3. **Entry point** — **Hello, my name is _____. I am a _____** (state your occupation—speech pathologist, psychologist, etc.). **I am here to talk to you about talking, thinking, and remembering things. I have some questions for you, and some things that I want you to remember. The first thing that I am going to ask you to remember is my name. It's _____** (state your name). **Do you remember what it is?**

   CUE: If examinee does not respond, or says the wrong name, say **It's _____** (state your name). **What's my name?**

   IF CORRECT, SAY: **OK, at the end of the test, I'll ask you my name, and you'll say it's _____** (state your name).

   1

4. **I'm going to read you a list of medications. When I finish, tell me as many of them as you remember. Ready? "Aspirin, Tums, Neosporin." Tell me as much of that list as you remember.**

   CUE: Provide a second trial if medications are omitted or repeated incorrectly.

   IF CORRECT, SAY: **Remember them, because I'm going to ask for them again.**

   SCORING: All three medications must be named.

   1

5. **Now I am going to read you a message. When I finish, tell me as much of it as you remember. Ready?**
   "Dr. White called to change your appointment from Wednesday at 9 to Wednesday at 11."
   Tell me as much of that as you remember.

   CUE: Provide a second trial if message is repeated incorrectly.

   IF CORRECT, SAY: **Try to remember this message also. In a few minutes, I'll ask you for my name, the three medications, and the message.**

   SCORING: Response must include <u>all</u> of the following information. Check all that were correctly remembered:

   ✔ (a) Dr. White   ✔ (e) Wednesday
   ✔ (b) called   ✔ (f) 9
   ✔ (c) changed/switched/rescheduled   ✔ (g) 11
   ✔ (d) appointment

   1

Case 1: Mild Impairment

Part B. Orientation

PURPOSE: Measures Orientation (OR)

CUES: If the examinee has not responded after 5 seconds, provide the specified cues. Do not provide additional cu[...]
receives a score of 1 point **regardless of whether cues are provided.** Note that yes/no questions are presented a[...]
questions must be correct to receive credit. Do not penalize examinees for dysarthric errors if speech is intelligible[...]

Item	Total raw score
a. Person & Situation	
6. **What is your first and last name?** CUE: If only first or last name is given, ask for missing part. If examinee does not respond after 5 seconds, rephrase as yes/no questions: **Is your name Davis?** (incorrect name) **Is your name _____?** (correct name)	☐
7. **How are you feeling today?** CUE: If examinee does not respond after 5 seconds, rephrase as yes/no questions: **Are you feeling OK?** (Gesture thumbs up.) **Are you feeling bad?** (Gesture thumb down.) SCORING: Response must be appropriate and meaningful.	☐
Entry point 8. **What happened to you? Why are you here?** CUE: If examinee does not respond after 5 seconds, rephrase as yes/no questions: **Are you here for _____?** (correct diagnosis) **Are you here for knee surgery?** (incorrect diagnosis)	1
9. **Have you noticed any recent changes in talking, thinking, or remembering things? Any other changes?** SCORING: Response must be consistent with medical records/caregiver report.	1
10. **What is your phone number?** SCORING: Response must include correct 7-digit number in correct sequence.	1
b. Place	
11. **What city are we in?**	

Case 2: Severe Impairment

Part A. Oral Expression I: Repetition & Immediate Recall

1. Please say what I say: "Ah."

   1

2. Please say what I say: "No."

   0

3. **Entry point** Hello, my name is _____. I am a _____ (state your occupation—speech pathologist, psychologist, etc.). **I am here to talk to you about talking, thinking, and remembering things. I have some questions for you, and some things that I want you to remember. The first thing that I am going to ask you to remember is my name. It's _____ (state your name). Do you remember what it is?**

   CUE: If examinee does not respond, or says the wrong name, say **It's _____** (state your name). **What's my name?**

   IF CORRECT, SAY: **OK, at the end of the test, I'll ask you my name, and you'll say it's _____** (state your name).

   0

4. **I'm going to read you a list of medications. When I finish, tell me as many of them as you remember. Ready? "Aspirin, Tums, Neosporin." Tell me as much of that list as you remember.**

   CUE: Provide a second trial if medications are omitted or repeated incorrectly.

   IF CORRECT, SAY: **Remember them, because I'm going to ask for them again.**

   SCORING: All three medications must be named.

5. **Now I am going to read you a message. When I finish, tell me as much of it as you remember. Ready?**
   "Dr. White called to change your appointment from Wednesday at 9 to Wednesday at 11."
   Tell me as much of that as you remember.

   CUE: Provide a second trial if message is repeated incorrectly.

   IF CORRECT, SAY: **Try to remember this message also. In a few minutes, I'll ask you for my name, the three medications, and the message.**

   SCORING: Response must include <u>all</u> of the following information. Check all that were correctly remembered:

   _____ (a) Dr. White   _____ (e) Wednesday

   _____ (b) called   _____ (f) 9

   _____ (c) changed/switched/rescheduled _____ (g) 11

   _____ (d) appointment

Case 2: Severe Impairment

Part B. Orientation

PURPOSE: Measures Orientation (OR)

CUES: If the examinee has not responded after 5 seconds, provide the specified cues. Do not provide additional cu
receives a score of 1 point **regardless of whether cues are provided.** Note that yes/no questions are presented a
questions must be correct to receive credit. Do not penalize examinees for dysarthric errors if speech is intelligible

Item		Total raw score
a. Person & Situation		
6.	What is your first and last name?	
	CUE: If only first or last name is given, ask for missing part. If examinee does not respond after 5 seconds, rephrase as yes/no questions: **Is your name Davis?** (incorrect name) **Is your name _____?** (correct name)	1
7.	How are you feeling today?	
	CUE: If examinee does not respond after 5 seconds, rephrase as yes/no questions: **Are you feeling OK?** (Gesture thumbs up.) **Are you feeling bad?** (Gesture thumb down.)	
	SCORING: Response must be appropriate and meaningful.	0
8.	What happened to you? Why are you here?	
Entry point	CUE: If examinee does not respond after 5 seconds, rephrase as yes/no questions: **Are you here for _____?** (correct diagnosis) **Are you here for knee surgery?** (incorrect diagnosis)	0
9.	Have you noticed any recent changes in talking, thinking, or remembering things? Any other changes?	
	SCORING: Response must be consistent with medical records/caregiver report.	
10.	What is your phone number?	
	SCORING: Response must include correct 7-digit number in correct sequence.	
b. Place		
11.	What city are we in?	

Interpreting SCCAN scores

1. **Total score**
   - **Total Raw Score with SEM (3.75)**
     - ➢ **Qualitative classification of severity**
     - ➢ **Percentile Rank**
     - ➢ **SCCAN Index Score**

2. **Scores for each of the eight SCCAN scales**
   - **Total Raw Score**
     - ➢ **Percentage**
     - ➢ **Clinical profile plot**

3. **Qualitative Description of Functional Performance**
   - **Informal review and description of test item performance**
   - **Report Summary Form (checklist)**

Interpreting test results

Scales of Cognitive and Communicative Ability for Neurorehabilitation

SCCAN

Examiner Record Booklet

Lisa H. Milman   Audrey L. Holland

Section 1. Identifying Information

Examinee's Name _____   Female ☐   Male ☐

	Year	Month	Day
Date Tested	_____	_____	_____
Date of Birth	_____	_____	_____
Age	_____	_____	_____

Facility _____

Examiner's Name _____

Examiner's Title/Occupation _____

Section 2. SCCAN Total Score Performance

Total Raw Score	SEM	%ile Rank	SCCAN Index	Degree of Severity
⬯	3.75	_____	⬯	_____

Section 3. SCCAN Degree of Severity

Typical Functioning	Mild Impairment	Moderate Impairment	Severe Impairment
Raw Score 87–94	Raw Score 69–86	Raw Score 47–68	Raw Score 0–46

Section 4. SCCAN Scale Performance

Scale	Score		Max. Score				Percentage Score
Oral Expression (OE)	_____	÷	19	= _____	× 100	=	_____
Orientation (OR)	_____	÷	12	= _____	× 100	=	_____
Memory (ME)	_____	÷	19	= _____	× 100	=	_____
Speech Comprehension (SP)	_____	÷	13	= _____	× 100	=	_____
Reading Comprehension (RD)	_____	÷	12	= _____	× 100	=	_____
Writing (WR)	_____	÷	7	= _____	× 100	=	_____
Attention (AT)	_____	÷	16	= _____	× 100	=	_____
Problem Solving (PS)	_____	÷	23	= _____	× 100	=	_____

Interpreting test results

Section 6. SCCAN Scale Totals

	Total raw score	OE	OR	ME	SP	RD	WR	AT	PS
Totals for page 2									
Totals for page 3									
Totals for page 4									
Totals for page 5									
Totals for page 6									
Totals for page 7									
Totals for page 8									
Totals for page 9									
Totals for page 10									
Totals for page 11									
Totals for page 12									
Totals for page 13									
Totals for page 14									
Total raw score									

1 2 3 4 5 6 7 8

Interpreting test results: Individual Performance Profiles

Interpreting test results: Report Summary Form

Scales of Cognitive and Communicative Ability for Neurorehabilitation

SCCAN
Report Summary Form
Lisa H. Milman   Audrey L. Holland

Section 1. Identifying Information

Examinee's Name _____ Date of Birth _____ Age _____

☐ Male ☐ Female

Race: ☐ Asian ☐ African American ☐ American Indian/Eskimo/Aleut ☐ White ☐ Other

Ethnicity: ☐ Hispanic ☐ Not Hispanic

Date of Evaluation _____ Facility Name _____

Facility Address _____

Date of Admission to Facility _____

Examiner's Name _____ Title/Occupation _____

Section 2. Medical History

Medical Diagnosis _____ Date of Onset _____

Lesion Location/Description _____

　CAT Scan (date) _____ MRI Scan (date) _____

Past Medical History _____

Prior history of a neurologic/psychiatric disorder? ☐ Yes ☐ No

　Description _____

Prior history of a language/learning impairment? ☐ Yes ☐ No

　Description _____

Premorbid Handedness ☐ Right ☐ Left ☐ Ambidextrous

Is English adequate for testing? ☐ Yes ☐ No

　Dominant language is not English but _____

　Other languages _____

Uses ☐ Eyeglasses/contacts ☐ Hearing aid

Vision is adequate for testing, i.e., examinee is able to see small environmental objects, such as a ring, call button, coins.

　☐ Yes ☐ No

Hearing is adequate for testing, i.e., examinee is able to hear a loud voice in a quiet environment.

　☐ Yes ☐ No

Motor function is adequate for testing, i.e., examinee is able to hold a pencil.

　☐ Yes ☐ No

Section 3. Social/Occupational History

Premorbid Functional Status _____

Premorbidly literate ☐ Yes ☐ No

Education (# of yrs.) _____ High school _____ College _____ Postgraduate

Current Living Arrangement _____ Alone _____ Other _____

Occupation _____

Section 4. Behavioral Observations

☐ behavior unremarkable   ☐ impulsive   ☐ confused
☐ somnolent   ☐ disinhibited   ☐ suspicious
☐ reduced affect   ☐ distractible   ☐ reduced insight
☐ reduced eye contact   ☐ perseveration   ☐ unconcerned
☐ reduced initiation   ☐ confabulation   ☐ labile
☐ increased response time   ☐ anxious   ☐ reduced frustration tolerance
☐ verbose   ☐ agitated   ☐ self-deprecating
☐ tangential   ☐ uncooperative   ☐ discouraged

Oral Expression

Speech production
☐ nonverbal/aphonic
☐ evidence of dysarthria/apraxia
☐ slow/press of speech
☐ effortful
☐ reduced intonation (flat affect)
☐ within normal limits (WNL)

Repetition adequate for
☐ isolated vowels
☐ words and sentences

Naming
☐ paraphasias (lexical/phonemic, neologisms)
☐ anomia
☐ accurate
☐ naming speed (word fluency) WNL

Connected speech primarily
☐ limited to automatic speech/social phrases
☐ limited to single words
☐ limited to short phrases
☐ limited to sentences
☐ discourse
☐ grammar
☐ content is meaningful and relevant

Conversational interaction
☐ communicates needs/preferences
☐ requests help/information
☐ refers to people by name
☐ initiates communication/changes topic
☐ recognizes/corrects speech errors
☐ participates fully in conversation

Comments: _____

2

Report Summary Form

Oral Expression

Speech production
- ☐ nonverbal/aphonic
- ☐ evidence of dysarthria/apraxia
- ☐ slow/press of speech
- ☐ effortful
- ☐ reduced intonation (flat affect)
- ☐ within normal limits (WNL)

Repetition adequate for
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Conversational interaction
- ☐ communicates needs/preferences
- ☐ requests help/information
- ☐ refers to people by name
- ☐ initiates communication/changes topic
- ☐ recognizes/corrects speech errors
- ☐ participates fully in conversation

Report Summary Form

Speech Comprehension

Attention and perception

- [ ] benefits from increased volume/ quiet environment
- [ ] benefits from reduced speech rate
- [ ] attends to speaker
- [ ] discriminates words/utterances
- [ ] discriminates prosody/tone of voice
- [ ] need for repetition/clarification WNL

Word comprehension adequate for

- [ ] high-frequency functional vocabulary (table)
- [ ] body parts (hand, thumb)
- [ ] animals (kangaroo, rhinoceros)
- [ ] lower frequency technical vocabulary (calculator)

Following directions adequate for

- [ ] 1-element directions (body part or object)
- [ ] 2-element directions (common objects)
- [ ] 3-element directions (body part, object, preposition)
- [ ] 8-element direction (abstract concepts, spatial relation)
- [ ] understands complex syntax
- [ ] understands nonliteral meaning

Comprehension of conversational interactions WNL for

- [ ] basic communications (social speech, short utterances)
- [ ] concrete sentences, short messages
- [ ] communication of numeric/temporal information
- [ ] conversation/abstract discourse

Report Summary Form

Reading Comprehension

Attention and perception

- ☐ visual acuity (+/− aid) appears WNL
- ☐ tracking functional (desktop/environmental stimuli)
- ☐ no evidence of neglect/field cuts (left, right, upper, lower)
- ☐ understands simple signs
- ☐ able to use communication board

Matches

- ☐ objects
- ☐ shapes
- ☐ spoken and written words

Comprehends at level of

- ☐ single word
- ☐ short phrase
- ☐ syntactically complex sentence
- ☐ paragraph

Contextual reading WNL for comprehending

- ☐ schedule
- ☐ basic printed materials (e.g., menu)
- ☐ written directions (e.g., medication label)
- ☐ reference materials (e.g., phone book)

Report Summary Form

Writing

Attention, perception, and motor control

- ☐ attends to task
- ☐ uses margins/borders WNL
- ☐ no perseveration noted
- ☐ letter size adequate and consistent (no micrographia)
- ☐ no evidence of tremor
- ☐ legibility WNL
- ☐ writing speed and effort WNL
- ☐ recognizes and corrects errors

Copying effective (communicates target) for

- ☐ letter
- ☐ name

Writing to dictation effective (communicates target) for

- ☐ high-frequency words (*dog*)
- ☐ low-frequency words (*newspaper, photography*)
- ☐ sentence

Picture description effective for

- ☐ spelling WNL for all writing tasks
- ☐ grammar WNL for all writing tasks
- ☐ meaningful written communications
- ☐ relevant (not tangential) written communications

Functional written communication

- ☐ adequate for copying isolated words/short message
- ☐ adequate for composing short notes/messages
- ☐ adequate for complex communications

Report Summary Form

Orientation and Memory

☐ oriented to person/place/time/situation

Verbal

Immediate recall

☐ therapist name

☐ three unrelated words (medications)

☐ sentence-level message

Delayed recall

☐ therapist name

☐ three unrelated words (medications)

☐ sentence-level message

☐ prospective memory (remembers to say name after test)

Visuospatial

Immediate recall

☐ face

☐ house

☐ medications (5 elements)

Delayed recall

☐ face

☐ house

☐ medications (5 elements)

Report Summary Form

Attention and Problem Solving

Verbal

Mental control/discrimination

- [ ] verbally identifies safety hazards
- [ ] identifies similarities/differences for concrete objects (shoe) and abstract concepts (lake/ocean)
- [ ] generates words within conceptual category (animals, beginning with letter *f*)

Planning/sequencing/organizing behavior

- [ ] describes sequence of events (mailing letter)
- [ ] plans a schedule given specified constraints

Numeric

Mental control/discrimination

- [ ] identifies numbers
- [ ] accurately reads time on a clock

Planning/sequencing/organizing behavior

- [ ] performs routine tasks (counts backward)
- [ ] computes basic arithmetic (adds bills)
- [ ] performs multi-operation tasks (change/percent)

Visuospatial

Mental control/discrimination

- [ ] locates familiar places on map
- [ ] identifies and differentiates similar visual materials (cats vs. roosters, shapes)
- [ ] groups items by category membership (trees, eating utensils, fruit)

Planning/sequencing/organizing behavior

- [ ] dials 9-1-1 in emergency
- [ ] draws picture to communicate (clock drawing)
- [ ] finds novel destination and traces route on map
- [ ] completes picture sequences depicting abstract concepts

Overview of attention and functional problem solving

- [ ] processing speed WNL for verbal/numeric/visual tasks
- [ ] problem solving WNL for basic verbal/numeric/visual tasks
- [ ] problem solving WNL for complex verbal/numeric/visual tasks

Report Summary Form

Section 6. Diagnosis and Recommendations

Therapy Diagnosis _____

_____

Target Areas for Therapy _____

_____

Short-Term Recommendations _____

_____

_____

_____

_____

_____

_____

Long-Term Recommendations _____

_____

_____

_____

_____

_____

_____

Presentation Outline

1. Assessment of communication and cognition: goals, priorities, & challenges
2. Brief measures of cognition and communication
3. Psychometric properties of the SCCAN
4. Administration procedures
5. Applications across the continuum of care
   Using the SCCAN with Goal Attainment Scaling in an OP setting (Alexis Missel)
   Using the SCCAN to evaluate clinical programs

Application 1:
Outpatient Services

(Schlosser, 2003)

1. *Client interview* and case history

    (ALA or GAS)

2. *Overview assessment* of impairment and functional implications for activity/participation

    (SCCAN and other relevant measures)

Targeted assessment of intervention objectives
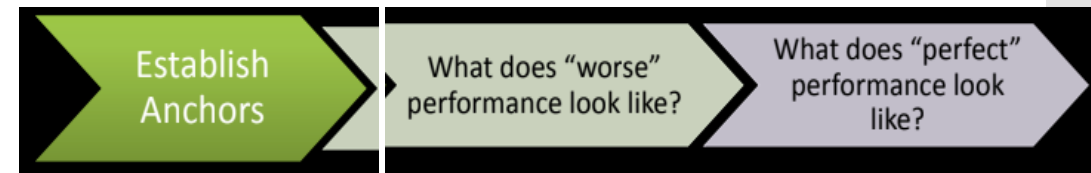
    (Task-specific probes)

3. *Creation of client-centered goals* via goal attainment scaling (GAS)

    objective data + client perspective + clinician expertise
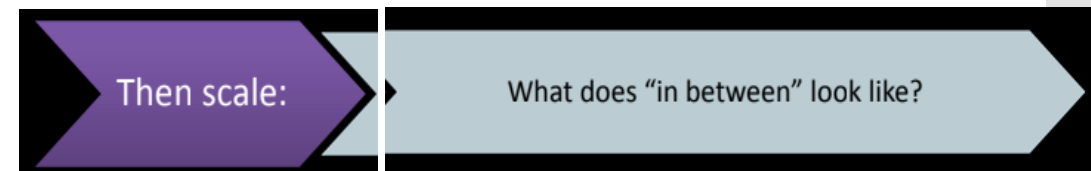
Application 1: GAS Procedure

1. **Determine** client's self-identified barriers and / or goals.

Identify the starting point → Describe the client's current performance
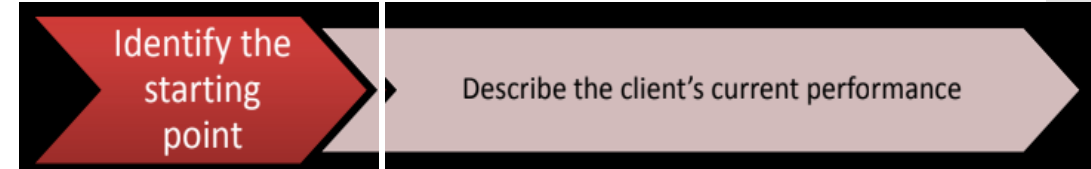
2. **Identify** baseline performance. **Collaborate** to determine what constitutes achievement.

Establish Anchors → What does "worse" performance look like? → What does "perfect" performance look like?

3. **Explain** intermediate, exceptional, and deteriorated levels of performance.

Then scale: → What does "in between" look like?

(O'Brien, K., Schellinger, S., & Kennedy, M., 2013)

Application 1: GAS Example

Level of Attainment	Goal
+2 Best Expected Outcome	Without written support, I will independently express a personal preference (i.e. "I want to stay home." or "I want to go out.") to my significant other in 80% of opportunities.
+1 More Than Expected Outcome	I will independently express a personal preference (i.e. "I want to stay home." or "I want to go out.") by reading a written prompt aloud to my significant other in 100% of opportunities.
0 Expected Outcome	**I will independently express a personal preference (i.e. "I want to stay home." or "I want to go out.") by reading a written prompt aloud to my significant other in 80% of opportunities.**
-1 Less Than Expected Outcome	I will independently express a personal preference (i.e. "I want to stay home." or "I want to go out.") by reading a written prompt aloud to my significant other in 60% of opportunities.
-2 Worst Expected Outcome	I will independently express a personal preference (i.e. "I want to stay home." or "I want to go out.") by reading a written prompt aloud to my significant other in 40% of opportunities.
Comments	*Timeline:* *Strategy:*

EXCEED → +2

GOAL → 0

BASELINE → -1

DECLINE → -2

(Schlosser, 2003)

Application 1: SCCAN & GAS

(Schlosser, 2003)

SCCAN	GAS
impairment and functional ability	*ICF levels and domains* applicability

Application 1:
SCCAN & GAS

(Schlosser, 2003)

- **Guide treatment & discharge planning**
- **Measure change**

↓

- identify barriers to generalizing treatment to everyday life
- self-anchor... of s... ... expected ...tcomes

- **Individual therapy**
- **Broad programs of service**

↓

- sensitive measur... identify th... ...ins rela...
- ...bility across goals and individuals
- focus on team energies

PERSONALIZED

Presentation Outline

1. Assessment of communication and cognition: goals, priorities, & challenges
2. Brief measures of cognition and communication
3. Psychometric properties of the SCCAN
4. Administration procedures
5. Applications across the continuum of care
   Using the SCCAN with Goal Attainment Scaling in the OP setting (Alexis Missel)
   Using the SCCAN to evaluate clinical programs (Gilmore, Foo, & Kiran)

Application 2: Program Evaluation
(Gilmore, Foo, & Kiran, 2019)

Academically-focused cognitive rehabilitation supports cognitive-linguistic recovery in college-bound adults with brain injury

Natalie Gilmore, MS, CCC-SLP; Lindsey Foo, MS, CCC-SLP; & Swathi Kiran, PhD, CCC-SLP
Speech, Language and Hearing Sciences, Boston University, MA

BOSTON UNIVERSITY
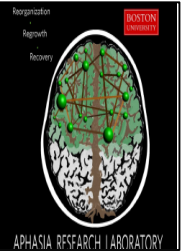
PRIMARY AIM

- Do young adults with ABI demonstrate significant improvements in cognitive-linguistic function over the course of multiple 12-week semesters of ICCR?

|	Age	MPO	Etiology
ICCR students (n=12)	25.9 (3.9)	58.3 (33.1)	TBI = 7 Stroke = 4 Tumor = 1
Control participants (n=6)	25.4 (3.9)	60.8 (45.4)	TBI = 4 Stroke = 2

Selected Assessments
- Western Aphasia Battery - Revised (WAB)[11]
- Repeatable Battery for the Assessment of Neuropsychological Status (RBANS)[12]
- Scales of Cognitive and Communicative Ability for Neurorehabilitation (SCCAN)[13]
- Discourse Comprehension Test[14]

Academically-focused cognitive rehabilitation supports cognitive-linguistic recovery in college-bound adults with brain injury
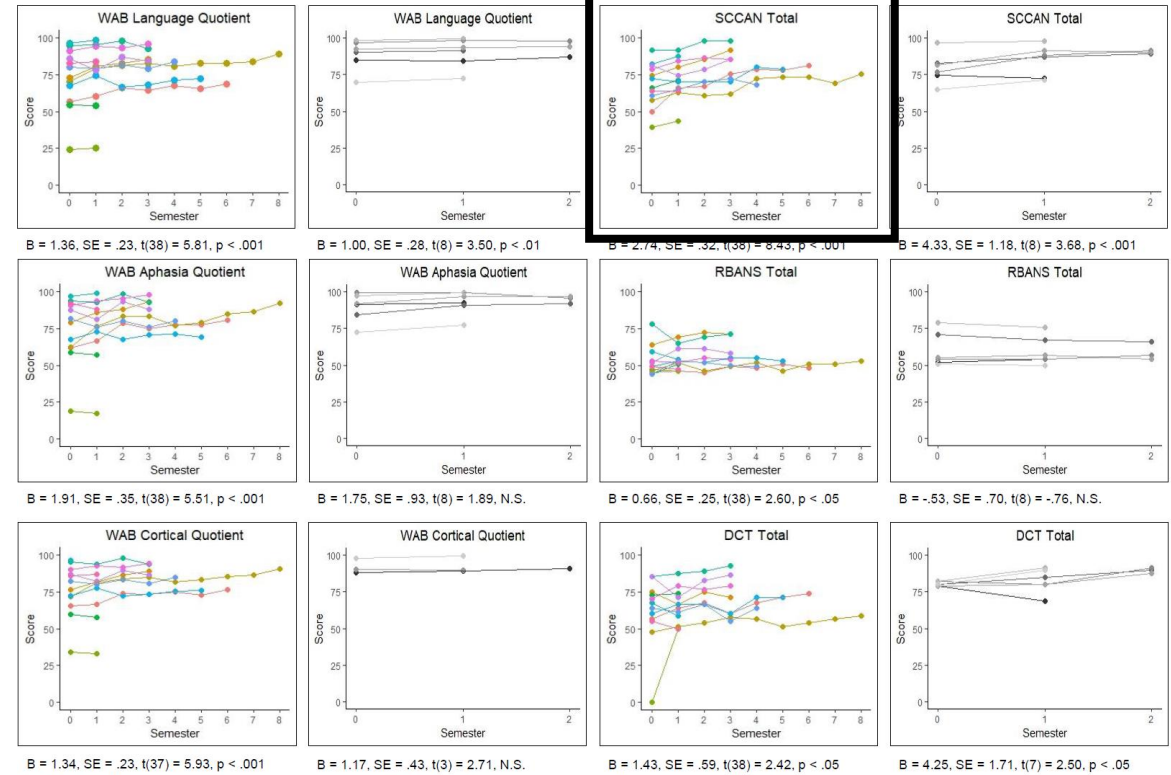
Natalie Gilmore, MS, CCC-SLP; Lindsey Foo, MS, CCC-SLP; & Swathi Kiran, PhD, CCC-SLP

Speech, Language and Hearing Sciences, Boston University, MA

SCCAN Total
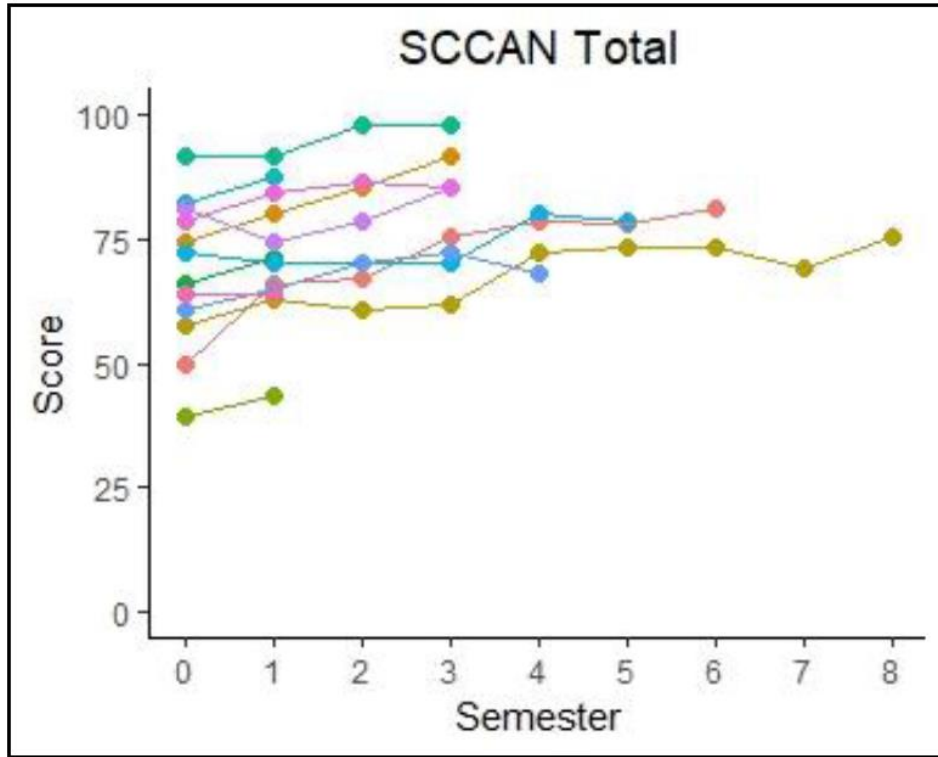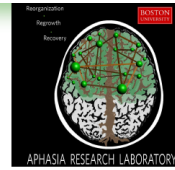
$B = 2.74, SE = .32, t(38) = 8.43, p < .001$

RESULTS

Composite Scores

Note: Statistics are for Semester, not Total N of semesters as they were all N.S.

Presentation Outline

1. Assessment of communication and cognition: goals, priorities, & challenges
2. Brief measures of cognition and communication
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4. Administration procedures
5. Applications across the continuum of care

Questions?

Thank you

Lisa Milman & Alexis Missel, USHA, 2020

Contact: lisa.milman@usu.edu