

An adaptation of the Cantonese version of Comprehensive Aphasia Test (Cant-CAT)



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Introduction: CAT and the Hong Kong clinical context, & preliminary Cant-CAT

The Comprehensive Aphasia Test (CAT) (Swinburn et al., 2004)

- 34 subtests divided into three parts: Cognitive Screen, Language Battery, Disability Questionnaire)
- Adapted into 15 different languages (but NOT in any Asian languages)
- Can be administered over two 45-to-60-minute sessions

Aphasia assessment for people with aphasia (PWA) in HK

- The only standardized diagnostic test: The Cantonese version of the Western Aphasia Battery (CAB; Yiu, 1992)

Cant-CAT

- Preliminary version in Cantonese, adapted by Kong and Ng (2022)
- Kept all 34 subtests of CAT
- Translated with control on Cantonese-specific psycholinguistic variables
- Piloted on nine Cantonese-speaking PWA and eight healthy individuals
 - Good concurrent validity, inter-, and intra-rater reliability
 - BUT content validity was not studied and sample size was small

2. Research Aims

- To investigate how well Cant-CAT discriminates between PWA and healthy individuals
- To evaluate Cant-CAT's ability to indicate aphasia severity (through within-group comparisons among PWA participants)
- To evaluate concurrent validity of Cant-CAT
- To establish inter-rater, intra-rater, and test-retest reliability of Cant-CAT

3a. Methodology

- Performance of PWA and controls in Cant-CAT subtests were compared, with reference to specific cut-off scores (determined at lowest 5th percentile of unimpaired participants' performance)
- Mean modality score of Cant-CAT and AQ in CAB were compared
- Concurrent validity: Cant-CAT subtest scores of PWA were compared against scores of tasks in similar domains in HK-OCS, CAB, and the Cantonese FACS
- Reliability: test-retest, inter-rater, intra-rater reliability were evaluated

3b. Participants & Data Collection

- 32 chronic stroke survivors
 - native Cantonese speakers
 - >6 months post-stroke
 - Recruited from & screened by two local community support groups

- Written consent
- Background questionnaire: age, gender, education level, year of stroke

- HK-OCS, CAB, Cant-CAT, Cant-FACS (~120-180 min)
- Face-to-face or online

Online retest on Cant-CAT at least 4 weeks after first session (~60 min)

Age	Male (primary)		Male (secondary)		Male (tertiary)		Female (primary)		Female (secondary)		Female (tertiary)	
	Con	PWA	Con	PWA	Con	PWA	Con	PWA	Con	PWA	Con	PWA
18-44	3	0	4	1	4	0	3	0	4	0	6	0
45-59	4	2	3	1	4	2	6	1	5	1	6	0
60 or above	3	8	3	8	4	0	3	6	3	2	4	0

4. Data analysis & Main Results

1 Cant-CAT performance of PWA and control

- 19 matched participants
- Mann-Whitney U test: PWA participants had significantly lower scores in 11/27 subtests (U range=37.0-92.5, $p \leq .002$)

2 Cant-CAT mean modality score and CAB AQ

- Raw score in eight modalities transformed nonlinearly into standardized scores
- Highly correlated ($r_s = .94$, $p < .001$)

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Concurrent validity

- Spearman's rank-order correlation coefficient between Cant-CAT subtests and subtest scores in HK-OCS, CAB, and Cantonese FACS were calculated
- Significant correlations except for Line Bisection and HK-OCS Hearts

Spearman's rank-order correlations between scores in subtests of Cant-CAT and subtests of HK-OCS, CAB, and Cantonese FACS

Domain	Cant-CAT subtest(s)	Validation subtest(s)	r_s	Strength
Visual neglect	Line bisection	HK-OCS Hearts (space symmetry)	.12	Little if any correlation
Cognition	Total score in the Cognitive Screen (except Line bisection)	Total score of HK-OCS except Hearts (space symmetry)	.58***	Moderate
Auditory comprehension	Modality score: Comprehension of spoken language	CAB II. Auditory verbal comprehension	.75***	High
Written word comprehension	Comprehension of written words	CAB V. D. Written word picture	.40*	Low
Repetition	Modality score: Repetition	CAB III. Repetition	.78***	High
Object naming	Naming objects	CAB IV. A. Object naming	.80**	High
Spoken picture description	Spoken picture description	CAB I. Spontaneous speech	.70***	High
Reading	Modality score: Reading	CAB V. Reading	.88***	High
Writing	Modality score: Writing	CAB VI. Writing	.79***	High
Social communication	Mean rating in #28 Talking and #29 Understanding	Cantonese FACS mean rating of Scale of Communication Independence in 'Social Communication' and 'Communication of Basic Needs'	-.70***	High
Daily use of reading and writing	Mean rating in #30 Reading and #31 Writing	Cantonese FACS mean rating of Scale of Communication Independence in 'Reading, Writing, Number Concepts'	-.58***	Moderate

Note: r_s = Spearman's rank-order correlation coefficient
* for $p \leq .05$, ** for $p \leq .01$, *** for $p \leq .001$

4. Data analysis & Main Results

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Test-retest reliability

- 13 participants participated in retest (online)
- Moderate to good test-retest reliability in two cognitive subtests
- Fair to excellent in 17/21 language subtests
- Moderate to good test-retest reliability of modality scores except for writing

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Inter-rater and intra-rater reliability

- Excellent to absolute inter-rater reliability (two raters) and intra-rater reliability (ICC range = .94-1.00, $p < .001$)

Test-retest reliability for subtests of Cant-CAT

Line Bisection	N	ICC(2,1) (95% CI)
Semantic memory	13	.206 (12, 12)
Word fluency	13	.813*** (12, 12)
Recognition memory	13	.164 (12, 12)
Gestural object use	13	.614** (12, 12)
Arithmetic	13	.318 (12, 12)
Comprehension of spoken words	13	.460** (12, 12)
Comprehension of written words	13	-.033 (12, 12)
Comprehension of spoken sentences	13	.830** (12, 12)
Comprehension of written sentences	13	.613** (12, 12)
Comprehension of spoken paragraphs	13	.128 (12, 12)
Repetition of words	13	.304 (12, 12)
Repetition of complex words	13	1.000 (12, -)
Repetition of nonwords	13	.704*** (12, 12)
Repetition of digit strings	13	.882*** (12, 12)
Repetition of sentences	13	.793*** (12, 12)
Naming objects	13	.868*** (12, 12)
Naming actions	13	.585** (12, 12)
Spoken picture description	12	.879*** (11, 11)
Reading words	13	.924*** (12, 12)
Reading complex words	13	.486* (12, 12)
Reading function words	13	.658** (12, 12)
Reading nonwords	13	.637** (12, 12)
Writing: copying	13	.844*** (12, 12)
Writing: picture naming	13	.079 (12, 12)
Writing to dictation	13	.822*** (12, 12)
Written picture description	13	.793*** (12, 12)
Talking	13	.653** (12, 12)
Understanding	13	.517* (12, 12)
Reading	13	.602 (12, 12)
Writing	13	.647** (12, 12)
Impact	13	.775*** (12, 12)
Self-usage	13	.637** (12, 12)
Emotional consequences	13	.603* (12, 12)
Modality score: Comprehension of spoken language	13	.732** (12, 12)
Modality score: Comprehension of written language	13	.772*** (12, 12)
Modality score: Repetition	13	.788*** (12, 12)
Modality score: Naming	13	.917*** (12, 12)
Modality score: Spoken picture description	12	.904*** (11, 11)
Modality score: Reading	13	.953*** (12, 12)
Modality score: Writing	13	.454 (12, 12)
Modality score: Written picture description	13	.833*** (12, 12)
Mean modality score	13	.924*** (12, 12)

Note: N = number of participants, ICC(2,1) = Intraclass correlation coefficient (two-way mixed model, single measure), df = degree of freedom
* ICC cannot be calculated due to zero variance in scores of participants in retest.
* ICC cannot be calculated due to zero variance in scores of participants in the first test

5. Discussion & Future Research

Discussion

- Cant-CAT modality scores are useful in estimating aphasia severity
- More comprehensive assessment results than CAB (more language subtests covered, wider range of difficulty level of items)
- Line bisection may be a limitation in achieving visual neglect screening
- Unsure if virtual assessment might have potentially affected participants' performance

Limitations

- Small and skewed sample size of PWA group
- Lack of comparable proportion of young PWA and PWA with higher educational level

Future research

- Expand on the scope of the current study by recruiting a larger and more representative sample of PWA
- Include diverse aphasia types and severity levels
- Study effect of in-person versus virtual administration of Cant-CAT on PWA's performance

6. Selected References

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