

Chen, K., Hill, K.J., McNeil, M., Pratt, S. *Translating and validating a Mandarin Chinese version of the Computerized Revised Token Test*. Paper presented at the 2009 Clinical AAC Research Conference in Pittsburgh, PA.

---

## **Translating and validating a Mandarin Chinese version of the Computerized Revised Token Test**

Kay (Szu-Han) Chen, Katya Hill, Malcolm McNeil, and Sheila Pratt  
University of Pittsburgh

### Abstract

This paper describes the research design and process of translating the Computerized Revised Token Test (CRTT) into the Computerized Revised Token Test-Mandarin Chinese (CRTT-Mandarin). The aim of this research is to generate psychometric data for evaluating the validity (and eventually, reliability) of the CRTT-Mandarin and for its eventual standardization for use as an assessment instrument.

The study will analyze the data of 40 native Chinese speakers between 38 and 80 years of age (20 with aphasia and 20 normals) on the Concise Chinese Aphasia Test (CCAT), and the CRTT-Mandarin. The future goal will be completing and publishing the CRTT-Mandarin for clinical use and creating an instrument that can be validly administered in both English and Mandarin Chinese to assess auditory comprehension impairments across both languages. In the future, the CRTT-Mandarin could be used to support the assessment of adults with aphasia who may benefit from augmentative and alternative communication (AAC).

Keywords: Chinese, assessment tools, aphasia, RTT, CRTT, and CCAT.

### Background

There is a paucity of standardized assessment tools available in Taiwanese speech-language pathology clinics. With this lack of available tests, there is no reasonable way to make informed clinical decisions using any of them. Therefore, creating an array of standardized tests is imperative in the development of the relatively new profession of speech-language pathology in Taiwan.

No single diagnostic tool can help clinicians identify the precise mechanisms and levels of impairment, measure performance change as a result of intervention or additional impairment, and differentially diagnose aphasia. One strategy that has proven valid and efficient in test development is to use existing tools that have been developed in other languages and translate them into the language that does not have such measures.

The Concise Chinese Aphasia Test (CCAT; Zhong, Li & Zhang, 2003) is the only standardized test available for assessing aphasia in Mandarin Chinese. It includes 9 subtests to test all language modalities. The Revised Token Test (RTT; McNeil & Prescott, 1978) is one of the most well-researched assessment tools for auditory comprehension in English (Arvedson et al, 1985; McNeil et al, 1989; Park et al, 2000). It has been developed into a computerized

assessment tool, Computerized-RTT (CRTT) by McNeil and colleagues (McNeil et al, 2008a, 2008b).

There are several ideal characteristics desired when selecting an assessment tool for translation and further development. The translated test is most productive when it: A) fills an unmet need such as that left by other tools extant within that given language community (i.e. Chinese), B) is shown to be a valid and reliable tool in the original language (i.e. English), C) is linguistically and culturally neutral in its native language, and D) can be easily translated into the target language without substantial changes that would challenge its validity, reliability or utility. The CRTT offers all of these characteristics, with the added benefit of computerized automaticity that further increases the practicality and reliability of administration and scoring.

### Objective

The objectives of this paper are to 1) report the procedures of translating and recording and 2) report the design of the research that is being employed to meet the long term goal of producing a standardized test in both English and Mandarin Chinese. 3) Obtain feedback on the research design and methods.

### Research Methods

**Participants:** The participants will be 20 persons with aphasia, and 20 normal individuals, the latter without a self-reported history of neurological disease. The age range will be 38 years old to 80 years old. They should have elementary education level or higher. All of the participants with aphasia will have a left-hemisphere cerebral infarct verified by medical diagnosis, as well a diagnosis of aphasia from a qualified speech-language pathologist. Exclusionary criteria will include self reported surveys of (1) acquired premorbid history of speech, language, hearing, or learning disorders, (2) a concurrent medical diagnosis of cognitive or psychiatric disorders (or as documented in medical records), (3) known uncorrected hearing or visual deficits that would interfere with performance of the experimental tasks.

**Material:** A self-report survey and a survey of history of bilingualism will be given to participants. The participants will complete the CRTT-Mandarin and the CCAT within 10 days of one another. Equipment will include a standard mouse (Logitech, M-BJ79), a laptop computer with 15.4"-diagonal widescreen (Compaq, C771US). SPSS 16.0 will be used to perform the data analysis.

### Acoustic stimuli

The acoustic stimuli will have been recorded by a male native Mandarin Chinese speaker. The speech rate will have been controlled from 3.5 to 4.0 syllables per second. The recording will have been completed in a sound attenuated IAC booth. Before the recording, the Chinese translation will be read by 10 native Mandarin speakers. If two or more judges disagree on any word in the translation, it will be replaced and judgments will again be made until 9 or more of the ten judges agree on all words. After the stimuli are recorded, the CRTT-Mandarin stimuli will be listened to by 10 native Mandarin speakers to note articulation or prosodic speech production errors. If errors are noted by two or more listeners, that stimulus will be re-recorded and again that stimulus will be listened to by the judged until they are judged to be free from speech production errors by 9 or more of ten judges.

## Procedures:

The participants will first be given a survey. The survey will determine the biographical (e.g. age, language history, etc.) eligibility (inclusion and exclusion criteria) of the participants. When the participant is eligible, a survey of history of bilingualism, the Computerized Revised Token Test-<sub>Mandarin</sub> and the Concise Chinese Aphasia Test will be administered in random order to each qualified participant. All participants will finish the two tests within a ten day period.

All participants will complete the CRTT pretest before starting the test. The pretest ensures that the participants' hearing, vision, motor skills and knowledge of the linguistic stimuli are adequate to complete the CRTT. If a participant is unable to complete the pretest, testing will be aborted and no further data will be collected on that individual. The auditory stimuli will be presented from the speaker and the participants will be asked to respond to the commands. Participants will use their left hand with the mouse. The responses and scores will be recorded by the computer program online. Upon the completion of the CRTT, those participants who did not first undertake the CCAT will be scheduled to complete the CCAT as soon as possible, but not longer than ten days. Each response will be scored using the 12-point multidimensional scoring system. The experimenter will administer and score the CCAT.

## Data Analysis Methods

Data will be categorized according to overall and subtest scores, for both the CRTT and the CCAT. A Spearman rank-correlation coefficient will be used to determine significant ( $p \leq 0.05$ ) and high ( $r > 0.7$ ) correlation coefficients in both overall and subtest scores derived from the CRTT and the CCAT in both the normal group and the group with aphasia. The Wilcoxon Signed-Rank test will be performed to determine significant ( $p \leq 0.05$ ) differences between normal and aphasic participants in CRTT overall and subtest scores.

## Conclusion

This study will have important ramifications not only for the Chinese population in Taiwan but also for the entire Chinese-speaking population world-wide. Because the CRTT is unbiased in terms of age, gender, educational and language level, the CRTT-<sub>Mandarin</sub> that is validated on a Taiwanese population will also have transparent application to Mandarin speakers in China. The test designed for mouse access method, which means any alternative access method that use direct selection, for example, head pointers, or joysticks can be used when people with AAC need a language assessment. The appropriate access method can help clinicians or educators receive the precise assessment results, then provide appropriate to the AAC population in Chinese community. The test will therefore have broad applicability to a very large population. The test will therefore have broad applicability to a very large population.

## References

1. Arvedson, J. C., McNeil, M. R., & West, T. L. (1985). Prediction of Revised Token Test overall, subtest, and linguistic unit scores by two shortened versions, *Clinical Aphasiology* (pp. 57-63): BRK Publishers.
2. McNeil, M. R., Dionigi, C. M., Langlois, A., & Prescott, T. E. (1989). A measure of Revised Token Test ordinality and intervality. *Aphasiology*, 3(1), 31-40.
3. McNeil, M. R., & Prescott, T. E. (1978). *Revised token test*: University Park Press.
4. McNeil, M., Sung, J., Pratt, S. R., Szuminsky, N. J., Kim, A., Ventura, M., et al. (2008). Concurrent Validation of the Computerized Revised Token Test (CRTT) and Three Experimental Reading Versions (CRTT-R) in Normal Elderly Individuals and Persons With Aphasia, *Clinical Aphasiology Conference*.
5. McNeil, M., Pratt, S. R., Sung, J., Szuminsky, N. J., Ventura, M., Kim, A., et al. (2008). Test-retest reliability of the auditory Computerized Revised Token Test (CRTT) and three experimental reading CRTT-R versions in normal elderly individuals and persons with aphasia, *Clinical Aphasiology Conference*.
6. Park, G. H., McNeil, M. R., & Tompkins, C. A. (2000). Reliability of the Five-Item Revised Token Test for individuals with aphasia. *Aphasiology*, 14, 5(6), 527-535.
7. Zhong, Y-M, Li, S-E, Zhang, M-X. (2003). *Concise Chinese Aphasia Test*. Taipei: Psychological Publishing Co., Ltd. (鍾玉梅, 李淑娥, & 張妙鄉. (2003). *簡明失語症測驗*. 台北: 心理出版社.)