Making Measurement Meaningful: Rasch Analysis and the ASHA FACS

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INTRODUCTION

Determining the measurement characteristics of an instrument is an important precursor to developing clinically meaningful measures. The ASHA Functional Assessment of Communication Skills for Adults (ASHA FACS) is a valid and reliable assessment used by many Speech-Language Pathologists to assess an individual's functional communication[1]. However, in its current form where subtest scores are summed and averaged, the results convey little about an individual's functional communication performance.

PURPOSE

The purpose of this study was to determine the psychometric properties of the items on the Social Communication Scale (SCS) of the ASHA FACS, using Rasch analysis (an item response theory).

METHODS

Participant Demographics:

- 130 caregivers of individuals with aphasia (caregiver was defined as anyone who provided 10 or more hours of care per day to a person with aphasia) were recruited from the VA Brain Rehabilitation Research Center in Gainesville, FL
- Age: *Mean* = 60.47 years of age (*SD* = 12.45, range 31 to 88)
- Gender Distribution: 76% female, 24% male

Instrument: The Social Communication subtest (SCS) of the ASHA FACS consists of 21 functional communication items rated on a 7-point equal-interval scale (1 = does not, 2 through 6 = does with x level of assistance, 7 = does).

Data Collection: Caregivers completed the survey after reading the instructions. Graduate students were available to answer questions that caregivers had about filling out the survey.

Analysis: Data were analyzed using WINSTEPS computer software[2]

Result of Rasch Analysis include:

- Unidimensionality
- Separation ratio and Internal Consistency
- Item hierarchy
- Floor and ceiling effects
- Rating scale utilization

RESULTS

Unidimensionality

- Fit statistics showed all 21 items were within the established criteria (Items may not fit construct if MnSQ ≥ 1.4 and ZSTD 2.0)
- Principal Components Analysis revealed that the first factor accounted for 20% of the residual variance
- Pragmatically, the SCS measured a single construct, although items loaded on two factors along item difficulty continuum (i.e. understanding and conversing)
- Understanding would have had a large ceiling effect
- Conversing would have had a large floor effect

Separation Ratio & Internal Consistency

- The person reliability index (analogous to Cronbach's alpha) was high (.90)
- Person fit statistics revealed that only 6% of the sample gave responses that were unexpected for their ability (Person may not fit sample if MnSQ ≥ 1.4 and ZSTD ≥ 2.0)

Item Hierarchy See Figure 1

- Actual item hierarchy substantiated the theoretical hierarchy established prior to the study.

Floor & Ceiling Effects See Figure 1

- 8 (6%) of individuals were at the ceiling of the measure
- There was no floor effect
- Items and person responses were distributed normally around their means

FIGURE 1

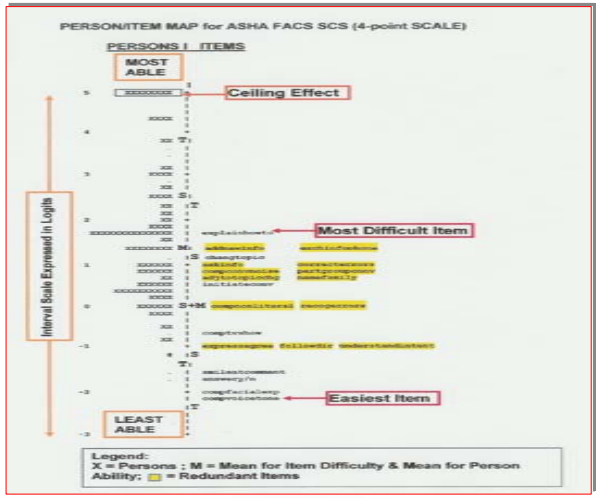
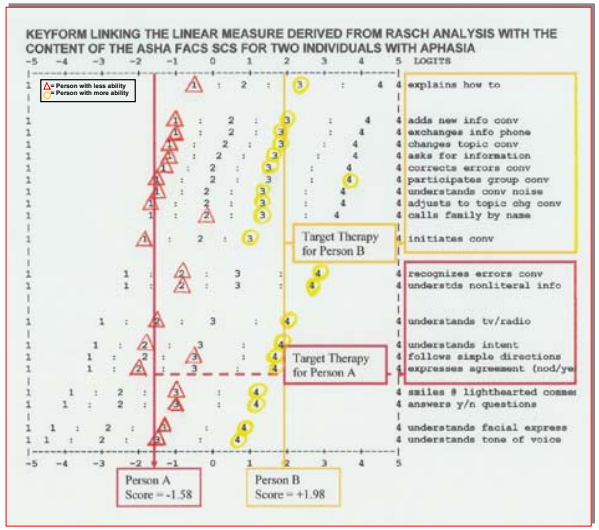


FIGURE 2



RESULTS (continued)

Item Redundancy See Figure 1- Seven items (33%) were redundant.

Rating Scale Utilization

- Reliable use of a 4-unit rating scale indicated that the 7 units were not meaningful to the raters
- Rating scale covered the full range of sample (approximately 2.94 statistically distinct levels)
- Rating scale met 8 established criteria to ensure that it was stable, accurate, descriptive of the sample and that the results could be used to make inferences for subsequent samples measured[3].

Keyform See Figure 2.

- Linked the linear measure to the qualitative content of the SCS.
- Illustrated the meaningfulness of the established item hierarchy and person ability ratings.

CONCLUSION & FUTURE DIRECTIONS

- The ASHA FACS is a valid and reliable instrument used by many Speech-Language Pathologists to assess functional communication.
- Rasch analysis of the measurement properties of the ASHA FACS SCS enhanced the instrument's meaningfulness by :
  - demonstrating that the theoretical construct of "functional communication" was real to both professionals and raters
  - establishing an item hierarchy so that a score can be equated to a behavior of functional communication
  - establishing a statistically reliable interval rating scale
- Keyforms provide further meaning to the SCS by linking the linear measure to the item hierarchy. This permits clinicians to:
  - demonstrate progress as an individual moves from easier items to more difficult items, or from one unit of the rating scale to the next
  - convey meaningful behavioral information when a person moves from one level of care to the next
  - demonstrate to student clinicians a hierarchical progression of functional communication to establish goals and target treatment
  - convey to caregivers, payors and other rehabilitation professionals a meaningful picture of a person's level of functional communication so that expectations are realistic, and communication with the person can be optimized.
- Future research using Rasch analysis of the ASHA FACS should include analysis of all subtests to see if the subtest constructs are separate, or if task complexity (expressing wants and needs and reading/writing) would fall along the hierarchy established by this analysis.

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