

Factor structures of Japanese version of WISC-4 and cognitive profiles of children with autism spectrum disorder. : Investigation of ASD subtypes based on Cattell-Horn-Carroll theory factors

Satoshi OKADA, Ph.D.

Associate Professor, clinical psychologist(japan)
Hokkaido university, faculty of education, japan

Introduction & Background

Cognitive assessment tools such as the Wechsler Intelligence scale for Children-fourth edition (WISC-IV) are used frequently for children with Autism Spectrum Disorder (ASD). Although ASD may have several subtypes, the cognitive profiles of ASD groups have not been reported separately and are not based on intelligence theories. The aim of this research is to examine the subtest structure of clinical samples with ASD via Cattell-Horn-Carroll (CHC) theory, which is a recent intelligence theory by confirmatory factor analysis (CFA). In addition, ASD subtypes will be identified and their cognitive profiles by cluster analysis of experimental variables of 5 converted CHC scores.

※ We administrated 12 subtests(including 2 subtests) to construct the CHC factors.

VCI subtests(Similarities : SI / Vocabulary : VO / Comprehension : CO)
PRI subtests(Block Design:BD /Matrix Reasoning:MR /Picture Concepts:PC
/Picture Completion:PP)

Results

- The WISC-IV was applied to children with ASD (N=246: 10tests=112, 12tests=134).
- Testers were Japanese clinical psychologist(author and co-researchers).
- 246 children were diagnosed ASD by psychiatrist and clinical psychologists (author, et al.) based on ICD -10
- ASD diagnoses are only Autistic disorder and Asperger's syndrome, excluding PDD, unspecified and Atypical autism.

Factor structures by CFA

The CFA confirmed that the CHC model was a good fit as well as WISC 4-factors model, and that the matrix reasoning subtest(MR) was loaded more on the visual-spatial factor (Gv) than the fluid reasoning factor (Gf). **Fig 1**

The CHC scores

The Gc score is an average of high loaded Subtest scores(more than .50, SI,VO,CO). Other scores were obtained in the same way. CHC scores of ASD sample (N=134) is shown in **Fig 2**.

The cluster analysis

Ward's method was applied. Explanatory variables were the difference scores between each subtest score and 12 subtest average.

7 clusters were identified based on dendrogram and cluster's interpretability

-3 Asperger types (asp1, asp2, asp3)

characterized by high Gc. **Fig 3**

-2 Autism types (au1, au2)

characterized by higher Gv than Gf **Fig 4**

-2 unreported type (Strong-Gs, Weak-Gv)

characterized by high Gs **Fig 5**

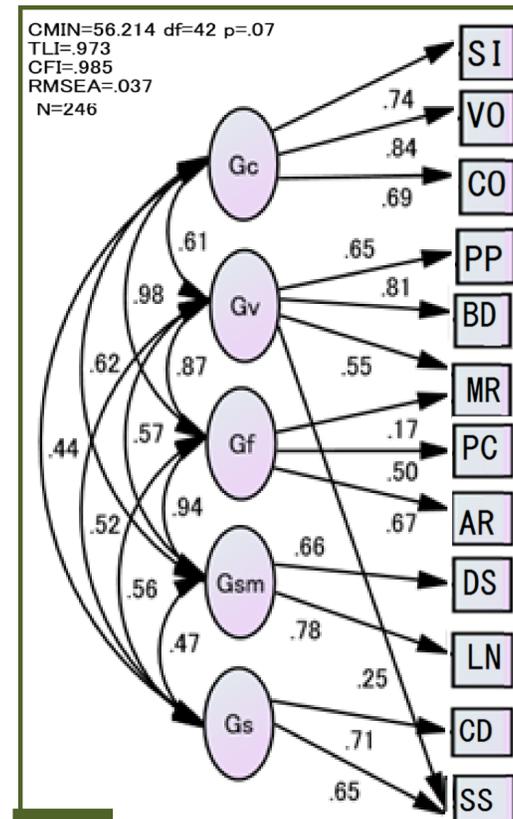


Fig 1

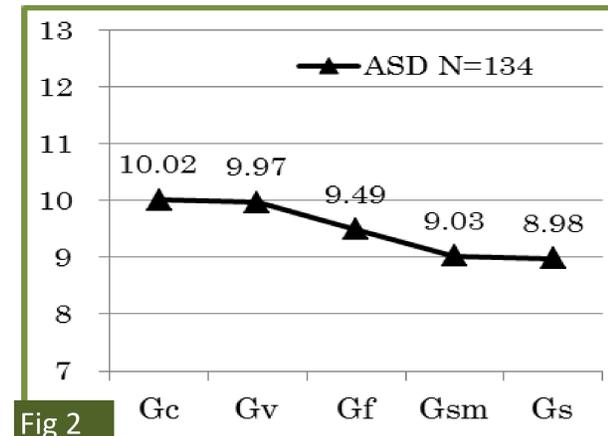


Fig 2

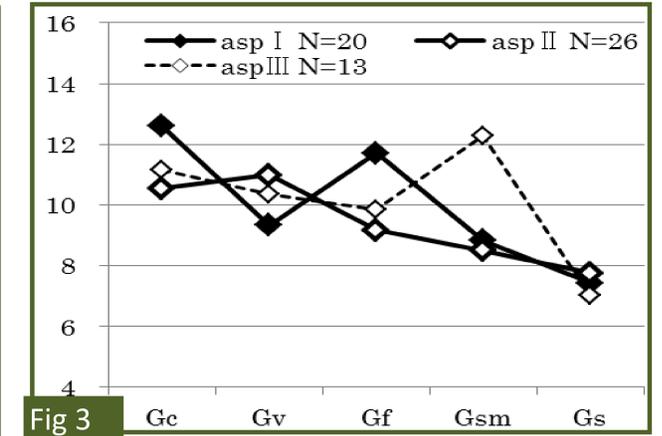


Fig 3

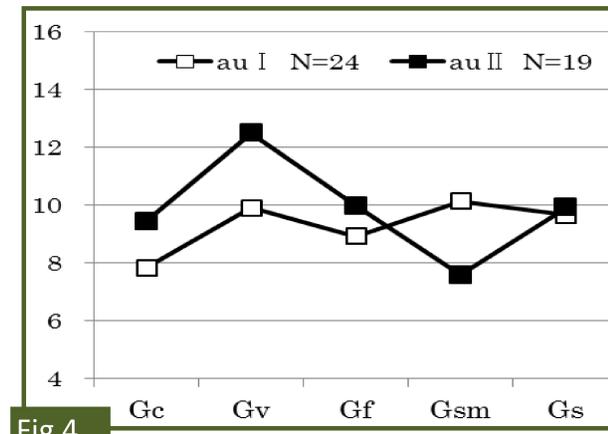


Fig 4

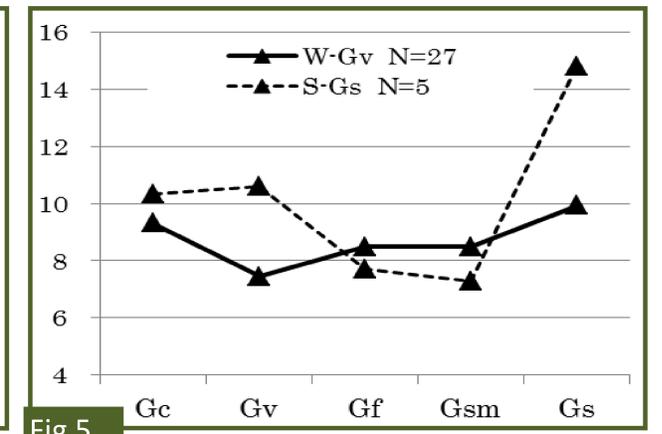


Fig 5

Conclusion

- The cognitive profiles of ASD were greater variability than previous reports. Weak Gv(Visual-spatial) and strong Gs(processing speed) were not reported in the previous researches.
- CHC factors are officially introduced from WISC-5. Especially, it is clinically important that practitioners understand children's cognitive profile of Visual-Spatial ability and Fluid Reasoning ability.
- Traditional research reported and discuss that ASD's disabilities reveal into Block Design and Processing Speed Index. But few case with ASD indicated that subtest and index score. specific difficulty of ASD should assess by other measures such as test behavior checklist, social emotional scale, Behavior rating inventory of Executive function