

# Factor Structure of a Testlet-Based Test

Soonmook Lee,  
Kyung Sook Choi, In-Soo Choe  
Department of Psychology, Sungkyunkwan University,  
Chongro-ku Myungryun-dong 3-ka, Seoul, 110-745, Republic of Korea,  
Email: [smlyhl@chol.com](mailto:smlyhl@chol.com)

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## Abstract

We will examine the methods of factor analysis on data of a testlet-based test. A testlet consists of a text and several items following it. In the data of a testlet-based test it is inevitable that testlet effect is included in items scores. For that reason, a testlet-based test is treated with care (e.g.: Lee, 2000; Lee & Frisbie, 1999; Sireci, Thissen, & Wainer, 1991). It is especially important to recognize that factor analysis cannot be correctly performed without taking the testlet effect into consideration. There are two strategies in performing factor analysis on testlet-based data. One is to remove testlet effect from the item scores testletwise, obtain residualized score for each item, and apply factor analysis on the pool of residualized scores in the test. The other is to apply factor analysis on the pooled item scores, estimate a factor structure, and use this structure as the hypothesis in the subsequent confirmatory factor analysis where the effect of each testlet is specified as a method factor. We examined the effectiveness of the first approach in recovering the substantive factor structure. The effectiveness varies to the degree of inter-correlations between testlets. In our Monte-Carlo study we used the following three factors as independent variables: inter-testlet correlation (.2, .4, .6); number of testlets in a test (2, 4, 6); number of substance factors (2, 4). We fixed the size of factor loadings to .5. For each of 18 conditions we have a prototype model and 25 samples of multivariate data were developed for the covariance data of prototype model. For each set of sample data, residualized scores were obtained and the prototype model was fitted to the scores. Root mean square residual (RMSR) representing the discrepancy between the prototype model and the residualized data was obtained for each sample. The result and implications will be presented and discussed.

## References

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