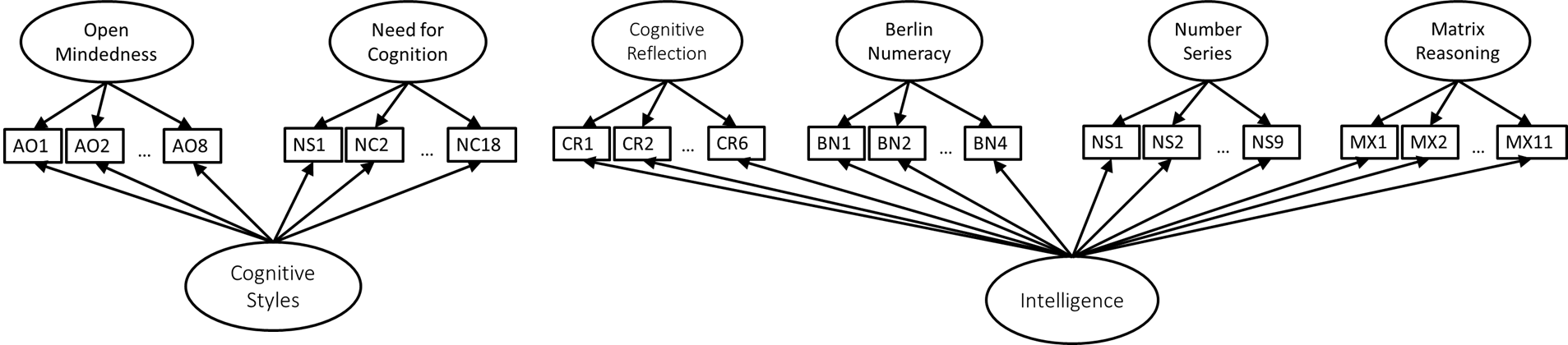
**Season 1 Individual Difference Measurement Models**

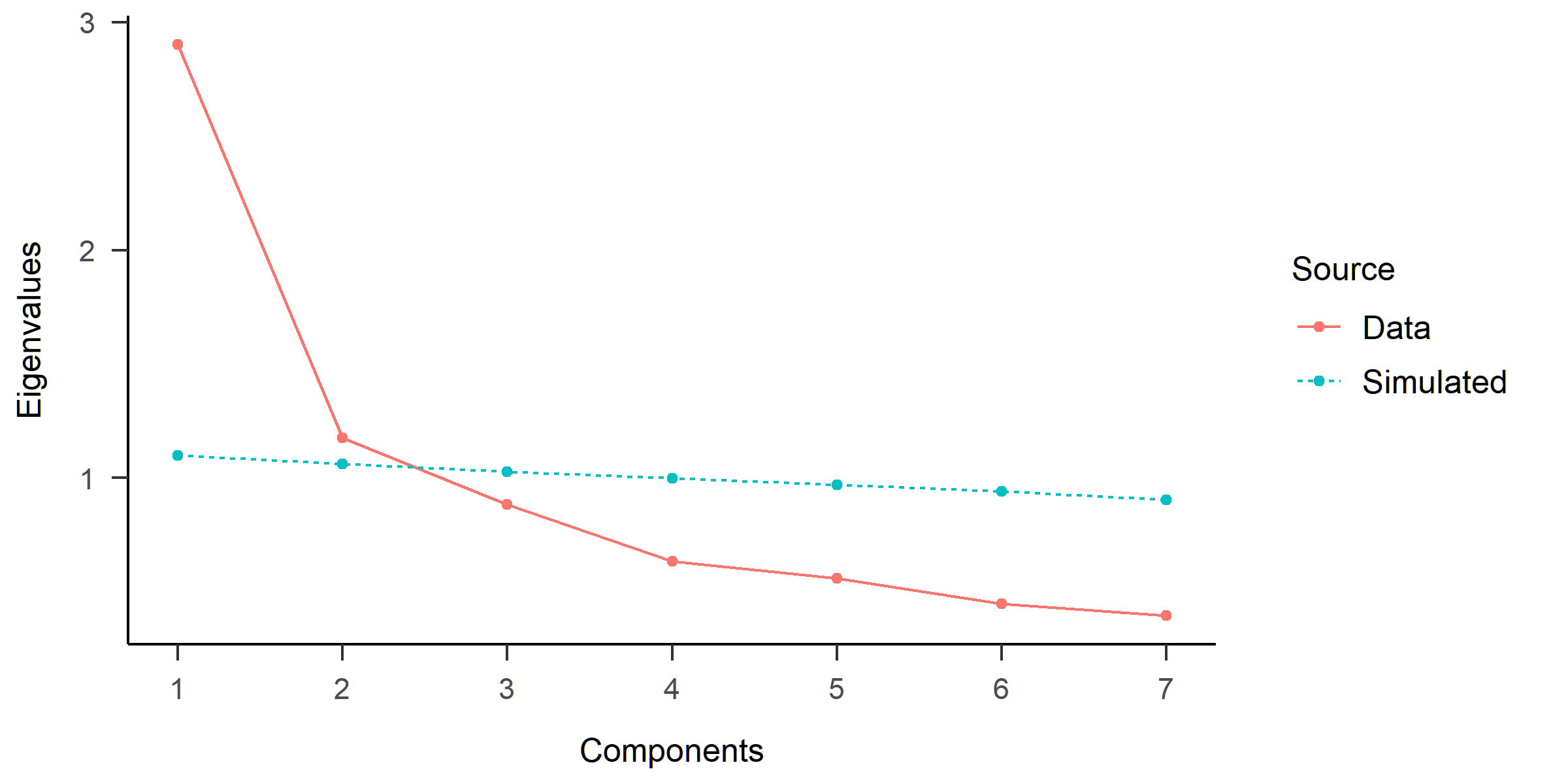
To reduce the dimensionality of the individual difference data from Season 1 and generate a more parsimonious measurement model, we adopted a two-step approach. We used the supplementary sample to generate model parameters, which were then applied to the core participants to obtain factor scores. First, as a preliminary check, the structure of the response information was examined using Principal Components Analysis, in a purely data-driven approach. We expected to confirm results obtained by Mellers, et al. (2015a), so we also took a theoretically driven confirmatory factor approach. Specifically, the four measures of fluid intelligence were expected to load onto a single trait, and the two measures of cognitive style were expected to load onto a single trait. Because the items associated with these scales have binary (correct vs. incorrect) and 5-point Likert response structures, a bifactor Item Response model was fit (Reise, 2012). The bifactor model, a variant of confirmatory factor analysis, is a method for distilling relevant constructs from individual items across different methods. It contains a general factor, representing the construct of interest, as well as method-specific factor. The method factors partial out variability unique to each scale, but not related to the construct of interest. See Figure 2 for the bifactor model path diagrams.



*Figure 2*. Path diagrams for bifactor models of intelligence measures and cognitive styles (Season 1). Each scale’s individual items load onto a general factor, which is the variable of interest. Scale-specific factors are also obtained to help account for measurement effects related to individual scales.

*Dimensionality of Individual Differences.* The results from GJP and the composition of our battery provide theoretical expectations that the four measures of fluid intelligence, two measures of cognitive style, and the political domain knowledge quiz would represent distinct factors. A principal components analysis (PCA) and a parallel analysis which compares the eigenvalues associated with each component to mean simulated eigenvalues from a series of randomly generated datasets of matching size and structure, suggested that the first two components reproduced a greater proportion of variance than would be expected by chance (See Figure 5). The component loadings (Table 3) revealed these components were driven by fluid intelligence scales (PC1) and cognitive styles (PC2). Political knowledge showed high loading on the third component. Given a priori theoretical expectations and this loading pattern, we proceeded to treat political knowledge as a separate third factor.

We next fit bifactor models for the fluid intelligence and cognitive style measures on the supplementary sample (n=1,380). Both models showed strong fit to the data; M2[[1]](#footnote-1)(375) = 721.11, RMSEA = .03, SRMSR = .03, CFI = .96 for fluid intelligence; M2(195) = 456.05, RMSEA = .03, SRMSR = .07, CFI = .95 for cognitive style. See Table 4 for mean item factor loadings on the general measures. Because the third factor (Political Knowledge) only represented a single scale, raw scores were used rather than factor scores.



*Figure 5.* Parallel analysis of principal components analysis of individual difference measures (Season 1).

Table 3

*Principal Component Loadings for Psychometric Surveys (Season 1; n = 1,380)*

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | PC1 | PC2 | PC3 | PC4 | PC5 | PC6 | PC7 |
| CRT | **-0.47** | 0.19 | -0.02 | 0.34 | -0.03 | -0.03 | -0.79 |
| BN | **-0.46** | 0.17 | -0.02 | 0.33 | 0.05 | -0.65 | 0.48 |
| NS | **-0.45** | 0.29 | 0.03 | 0.14 | -0.16 | 0.73 | 0.37 |
| Matrix | **-0.37** | 0.29 | 0.18 | -0.85 | 0.02 | -0.15 | -0.07 |
| AOMT | -0.33 | **-0.53** | 0.19 | -0.01 | 0.74 | 0.15 | 0.02 |
| NFC | -0.26 | **-0.63** | 0.32 | -0.04 | -0.65 | -0.06 | 0.01 |
| PK | -0.23 | -0.28 | **-0.91** | -0.19 | -0.08 | 0.03 | 0.01 |
| Prop. Var | 0.41 | 0.17 | 0.13 | 0.09 | 0.08 | 0.06 | 0.06 |
| Cum. Var | 0.41 | 0.58 | 0.71 | 0.80 | 0.88 | 0.94 | 1.00 |

Note: Intelligence measures show greatest absolute loadings on the first Principal Component (PC), cognitive style measures on the second PC, and political knowledge on the third PC

Table 4

*Mean Item Level Factor Loadings for Intelligence and Cognitive Style Scales (Season 1; n= 1,380)*

|  |  |  |
| --- | --- | --- |
| Scale | Intelligence | Cognitive Style |
| BN | 0.68 | -- |
| CRT | 0.73 | -- |
| MTX | 0.35 | -- |
| NS | 0.53 | -- |
| AOMT | -- | 0.30 |
| NFC | -- | 0.44 |
| PK | -- | -- |

Maydeu-Olivares, A., & Joe, H. (2006). Limited information goodness-of-fit testing in multidimensional contingency tables. *Psychometrika*, *71*(4), 713.

Mellers, B. A., Stone, E. R., Atanasov, P., Rohrbaugh, N., Emlen Metz, S., Ungar, L., Bishop, M. M., Horowitz, M., Merkle, E., & Tetlock, P. E. (2015). The psychology of intelligence analysis: Drivers of prediction accuracy in world politics. *Journal of Experimental Psychology: Applied*, *21*(1), 1–14. https://doi.org/10.1037/xap0000040

Reise, S. P. (2012). The rediscovery of bifactor measurement models. *Multivariate Behavioral Research*, *47*(5), 667–696.

1. M2 is a fit statistic derived by Maydeu-Olivares & Joe (2006) which is asymptotically χ2 distributed with corrected empirical Type I error rates. [↑](#footnote-ref-1)