**Cognitive Composite Scores of JHU Cognitive Data, Derived From CFA**

Annual BIOCARD visits include a comprehensive battery of neuropsychological tests from multiple cognitive domains. In order to reduce the amount of cognitive data considered in statistical analyses, we conducted a confirmatory factor analysis (CFA) in order to justify the creation of domain-specific cognitive composite scores from visit 101 onwards. This document describes how these composite scores were created. **Note, cognitive composites were only created for study visits conducted at Johns Hopkins, i.e., for visit 101 onwards.**

Application of CFA: Using CFA, we (1) confirmed that a set of a priori selected neuropsychological tasks load on their hypothesized cognitive factors and (2) established task weights for creating composite scores. Based on these results, cognitive composite scores were calculated for four domains of cognition, with three tasks contributing to each score: episodic memory, executive, visuospatial, and language.

Data processing prior to creating the composite scores:

1. For each subject, for each visit, FAS fluency scores were calculated by summing correct recall for the individual Fluency F (C1A101A), Fluency A (C1A102A), and Fluency S (C1A103A) measures.
2. Visit 101 means and standard deviations were calculated for each task shown in the table below, and using all available visit 101 data, across all subjects.
3. All task scores were converted to z-scores using the visit 101 means and standard deviations (calculated in Step 2).
4. Trails B (C1207B) z-scores were reverse scored to ensure higher scores always reflect better performance.

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| **Cognitive Domain** | **Task** | **Cognitive Data File Variable** | **Standardized Factor Loading** |
| Episodic Memory | Logical Memory Delayed | C1209A | 0.72 |
|  | Paired Associates Immediate | C1A109 | 0.74 |
|  | CVLT Total Recall on Trials 1-5 | C1A117 | 0.76 |
| Executive | Digit Span Backward | C1205A | 0.44 |
|  | Trails B (reverse scored) | C1207B | 0.80 |
|  | Digit Symbol Substitution | C1208A | 0.80 |
| Visuospatial | Rey Figure Copy | C1A107 | 0.54 |
|  | Rey Figure Recall | C1A108 | 0.71 |
|  | Block Design | C1A106 | 0.87 |
| Language | Boston Naming Test | C1210A | 0.53 |
|  | Fluency, Animals | C1206A | 0.73 |
|  | Fluency, FAS (calculated) | ∑(C1A101A, C1A102A, C1A103A) | 0.68 |

Calculation of the cognitive composite scores:

1. For each subject, for each visit, individual task z-scores were weighted by their respective standardized factor loadings, shown in the table above.
2. For each subject, for each visit, four separate cognitive composite scores were created by summing the weighted task scores within each cognitive domain.
   1. For example, the composite score for Episodic Memory reflects the sum of the following: (z-scored Logical Memory Delayed\*0.72) + (z-scored Paired Associates Immediate\*0.74) + (z-scored CVLT Total Recall\*0.76).
   2. Treatment of missing data: If a subject did not have scores for all three tasks within a cognitive domain, the composite score was set to missing for that visit.