

## **Modelling cognitive ability level and change in the LBC1936**

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At each Wave of the LBC1936 study, participants completed a battery of individually administered cognitive tests. With five Waves of cognitive test data now available, the LBC1936 sample offers a rare opportunity to examine age-associated cognitive decline, across multiple cognitive ability domains and general cognitive ability, over the entire 8th decade of life.

The “factor-of-curves” model, which is an extension of the growth curve model, offers one analytical approach that can be applied to these longitudinal data. Using scores from thirteen cognitive tests, the model estimates each cognitive test’s level at Wave 1 and slope of its change between Waves 1 and 5. It then organises the individual cognitive tests’ levels and slopes into a higher-order latent factor structure which captures level and slope of cognitive ability domains (verbal memory, visuospatial ability, processing speed, and crystallised ability) and general cognitive ability.

The LBC team have developed code for this factor-of-curves model; it is available for both R and Mplus and is free for researchers to use.

### **Further reading:**

#### **Introduction to fact-of-curves models**

McArdle, J. J. (1988). Dynamic but structural equation modeling of repeated measures data. In *Handbook of multivariate experimental psychology* (pp. 561–614). Springer.

Wickrama, K. K., Lee, T. K., O’Neal, C. W., & Lorenz, F. O. (2016). *Higher-order growth curves and mixture modeling with Mplus: A practical guide*. Routledge.

#### **Some previous studies that applied a factor-of-curves model to LBC1936 cognitive data**

Altschul, D. M., & Deary, I. J. (2020). Playing analog games is associated with reduced declines in cognitive function: A 68 year longitudinal cohort study. *The Journals of Gerontology: Series B*, gbz149.

McGrory, S., Ballerini, L., Okely, J. A., Ritchie, S. J., Doubal, F. N., Doney, A. S., Dhillon, B., Starr, J. M., MacGillivray, T. J., & Trucco, E. (2019). Retinal microvascular features and cognitive change in the Lothian-Birth Cohort 1936. *Alzheimer’s & Dementia: Diagnosis, Assessment & Disease Monitoring*, 11(1), 500–509.

Ritchie, S. J., Tucker-Drob, E. M., Cox, S. R., Corley, J., Dykiert, D., Redmond, P., Pattie, A., Taylor, A. M., Sibbett, R., & Starr, J. M. (2016). Predictors of ageing-related decline across multiple cognitive functions. *Intelligence*, 59, 115–126.