This book lays out the reasons why we should study cognitive development in adulthood, and presents the history, latest data, and results from the Seattle Longitudinal Study (SLS), which now extends to over forty-five years. The SLS is organized around five questions: does intelligence change uniformly throughout adulthood, or are there different life-course-ability patterns? At what age and at what magnitude can decrement in ability be reliably detected? What are the patterns and magnitude of generational differences? What accounts for individual differences in age-related change in adulthood? Can the intellectual decline that increases with age be reversed by educational intervention? Based on work on the SLS, this book presents a conceptual model. The model represents this book's author's view on the factors that influence cognitive development throughout the human lifespan, and provides a rationale for the various influences that have been investigated — genetic factors, early and current family environment, life styles, the experience of chronic disease, and various personality attributes. The data in this volume include the 1998 longitudinal cycle of the SLS. In light of both new data and revised analyses, psychometric and neuropsychological assessments have been linked in long-term data to aid in the early identification of risk for dementia in later life. The book also presents new data and concludes on the impact of personality on cognition. It includes correlation matrices and web-access information for select data sets.
This chapter aims to set Burt's early work on factor analysis in context, in the process providing an account which revises commonly held, accepted, and incorrect views as to priorities in this field. In so doing, the chapter predicts that hackles will be raised and it states that this provides the opportunity for others to criticize this account. The squabbles and backstabbing that seem so inevitable a part of academic rivalry and which are the constant subtext of this chapter are one of the least attractive aspects of academic life. The chapter first sets the context of Burt's early work, paying particular attention to Spearman and the issues his theory raised, and drawing attention to J. C. Maxwell Garnett, a largely neglected figure whose contribution has been much underrated. Then it looks at what Burt himself did, identifying the novelty of his contribution.

Random matrix theory and (big) data analysis
Jean-Philippe Bouchaud

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This chapter reviews methods from random matrix theory to extract information about a large signal matrix C (for example, a correlation matrix arising in big data problems), from its noisy observation matrix M. The chapter shows that the replica method can be used to obtain both the spectral density and the overlaps between noise-corrupted eigenvectors and the true ones, for both additive and multiplicative noise. This allows one to construct optimal rotationally invariant estimators of C based on the observation of M alone. This chapter also discusses the case of rectangular correlation matrices and the problem of random singular value decomposition.

Financial Networks
Guido Caldarelli and Alessandro Chessa

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The time series of the financial market stock quotations can be correlated with each other. A network structure naturally emerges if one considers these correlations as similarity links between pairs of stocks. In this way the correlation matrix corresponds to the adjacency matrix of the associated network. The online Yahoo! Finance service provides daily stock quotations and also some historical data for many important industries. Through this service it is possible to study the overall market behaviour for specific years. A means of extracting relevant information is provided through the minimal spanning tree. This algorithm is able to highlight particular industry clusters which go in the same direction in terms of market performance.