

## **Preface to the Second Edition**

A lot has happened since I submitted the final manuscript for the first edition of this book in 2015, but not much has changed. As I discovered writing this second edition in 2022, the weight of evidence for the key topics is even stronger now. This is due in no small way to a new generation of researchers who have access to more advanced technology and data analysis methods, and access to incredibly large databases that include DNA, neuroimaging, and cognitive testing. Intelligence research is subject to the same inevitable progress as all other areas of science driven mostly by observations and insights from methodological and technical advances. I am happy to report that the last seven years have sharpened our neuroscience understandings and the formulations of questions still to be answered.

This edition includes new sections on predicting intelligence measures from DNA using polygenic scores (PGSs). The fact that such prediction is possible further debunks stubborn views that intelligence has little to do with genes and that intelligence cannot be assessed for scientific study. But, more importantly, these findings invigorate efforts to understand how gene expression influences intelligence. They open the door for molecular biology research that could identify salient mechanisms that underlie the cognitive processes necessary for intelligence. It is this kind of research that I believe could someday result in ways to dramatically enhance intelligence for individuals. I still believe that is the ultimate and noble goal of intelligence research.

There also are new sections on neuroimaging and connectivity analyses to identify specific brain networks and circuits relevant to intelligence and to individual differences. This kind of research similarly has potential to identify ways to manipulate network information flow within and across brain areas to enhance intelligence. Related to these advances, many cognitive neuroscientists previously focused on learning and memory have broadened their interests to specially study intelligence and individual differences. It's not just about psychometrics anymore, but meaningful collaborations still require psychometric sophistication.

The chapters in this edition have been updated with new research findings and references. There were many to choose from and I could not include them all. Mostly, their findings are consistent with those discussed in the first edition. This may be the result of my unconscious cherry-picking or it may reflect the robustness of the underlying phenomena. Time will tell and I will be the first to change my mind if the weight of evidence changes. But, as always in science, new data typically make the explanatory picture more complex, not less. We see this in the stunning images from the James Webb telescope and their impact on cosmology theories. There is poetry and a bit of magic in these images. As neuroscience approaches go deeper and deeper into smaller and smaller brain structures and faster and faster functions, the complexity is both beautifully grand and nightmarishly challenging. That dynamic is the excitement of intelligence research that I hope to convey on every page. The poetry and magic are up to you.