

Copyright is owned by the Author of the thesis. Permission is given for a copy to be downloaded by an individual for the purpose of research and private study only. The thesis may not be reproduced elsewhere without the permission of the Author.

**Integrity, Conscientiousness, Neuroticism, and Ability: Relationships and  
Measurement.**

**A dissertation presented in fulfilment of the requirements for the degree of**

**Doctor of Philosophy**

**in**

**Psychology**

**at Massey University, Palmerston North,**

**New Zealand.**

**Paul Q. Wood**

**2011**

## Abstract

The purpose of this dissertation was to increase knowledge relevant to psychometrically oriented workplace selection and classification. Multivariate relationships among integrity, conscientiousness, neuroticism, and fluid and crystallised ability scales were investigated. Adverse impact and the capacity to use response time information as criteria of ability scoring were also investigated. These three foci all had the potential to contribute knowledge capable of increasing the accuracy of the measurement and interpretation of commonly used psychometric assessments.

Two cross-sectional studies were undertaken. The first study used archival data for extant assessments of ability, general personality, and integrity. It involved 211 participants having undertaken assessments as a function of job applications. The second study designed and piloted new scales of integrity, conscientiousness, neuroticism, and fluid and crystallised ability. It involved 317 participants who completed these scales online as voluntary participants.

The first study found integrity to be related to both conscientiousness and neuroticism, but not substantially related to ability. Conscientiousness was also negatively related to crystallised ability. These findings were replicated in the second study. The first study's neuroticism scale which included a suspicion/cynicism facet (i.e., subscale) had a negative relationship with ability indices. This finding was not replicated in the second study. This may have been due to the absence of a neuroticism facet measuring suspicion/cynicism in the second study.

Those identifying as Māori within the first study were found to score substantially less well than non-Māori on crystallised ability indices, but not other scales measured. Calculations suggested any resulting adverse impact could be reduced by combining ability assessments with scales of integrity, conscientiousness, and neuroticism. These calculations were based in part upon the assumption that relationships among assessments are likely to account for shared variance in job performance predictions. No significant differences were found in the second study; although the very small sample size used ( $N = 22$ ) encourages caution regarding the robustness of this result.

Findings from the second study also suggested that relative to low-ability respondents, high-ability respondents took less time to complete crystallised items and more time to complete fluid ability items. A small significant relationship was also observed between conscientiousness and the length of time taken to complete the fluid ability scale.

The studies undertaken had a number of limitations. One limitation shared across these studies was the very small number of participants identifying as Māori (N46 in Study 1 and N22 in Study 2). Another common limitation was the inability to generalise findings based upon cross-sectional data drawn from participant groups of convenience rather than individuals selected via probability sampling.

Despite such limitations the preceding findings have a number of practical implications. One such implication is that relationships among scales may vary according to whether the level of analysis undertaken is at the Big Five or facet level and whose version of a scale is examined. On this basis practitioners should examine items in order to understand scale output, and researchers should examine relationships at the level of facet or ability subcomponent. Practitioners should also use personality assessments alongside those of ability if they wish to maximise predictive validity and reduce adverse impact for those identifying as Māori. Furthermore, the use of response time information in testing is probably better suited to controlling and checking respondents' approach to answering assessments than incorporation in scoring algorithms.

This dissertation makes two novel contributions concerning relationships between response time and participant characteristics. Firstly, negative relationships between ability indices and conscientiousness or neuroticism scales appear real. They do not appear to be a consequence of more conscientious or neurotic respondents taking longer to complete ability scales. Secondly, poor time-management strategies do not explain response time results that are inconsistent with the belief that higher-ability respondents will complete assessments more quickly than their lower-ability peers. Differences in the cognitive requirements associated with fluid and crystallised tasks instead appear to explain why higher-ability respondents take relatively less time to complete crystallised scales, but relatively more time to complete fluid ability scales.

## Acknowledgements

Dante Alighieri's the Divine Comedy begins "*Mid way this way of life we're bound upon, I woke to find myself in a dark wood where the right road was wholly lost and gone.*" I once shared this fate...In much the same way as Virgil guided Dante, so too have countless others helped me find my "right road." My father Brian Wood has always being chief amongst such supporters. This dissertation provides him with another positive milestone along the journey of his most prodigal son. My brothers Jon, Andrew, and Chris have also played important parts. Jon and Chris always strongly encouraged me and the sibling rivalry associated with submitting before Andrew completed his Ph.D. at the London School of Economics provided additional motivation. My sister-in-law Cristiane also deserves a special mention for always enquiring after my progress and keeping me focused on my goals.

I will never be able to thank my supervisors adequately. There was always the unceasing support and advice, but their willingness to go beyond the call of duty leaves such platitudes better suited to other dissertations. Dr Gus Haberman and Dr Stephen Hill travelled hours out of their way to see me when I was constrained. They also made time to coax me through literacy lessons better suited to remedial English than Ph.D.s. Without their assistance I would not have submitted this dissertation.

The list of others who have supported me is long. There are many who have provided general encouragement or support, but the following list of people is limited to those who have made important contributions to the completion of this Doctorate: Dr Paul Englert, Dr Glenn Brown, Professor David Thomas (A.K.A. Uncle Dave), John Barlow, Mike Young, Henare Davidson, Susannah Sommerville, and Alison White. I would also like to say a special thanks to Chloé Hamman. She helped proof sections of this dissertation and served as a sounding-board for my ideas. As a function of this journey she has also tolerated a regularly stressed, distracted, and absent partner. I only wish my mother had lived to meet you. I dedicate this dissertation to my mother's memory:

**Mary Jean Wood**  
**1941 - 1995**

## Table of Contents

Title Page.....	i
Abstract .....	ii
Acknowledgements .....	iv
List of Tables and Figures .....	ix
Chapter 1: Introduction .....	1
Section 1.1: Dissertation Aims and Objectives.....	1
Section 1.2: Importance of Study.....	5
Section 1.2.1: Practical Value.....	5
Section 1.2.2: Contribution to Knowledge .....	10
Section 1.3: Chapter Overviews.....	13
Chapter 2: Literature Review: .....	15
Recruitment and Psychometric Prediction .....	15
Section 2.1: Context and Rationale for Predictor Choice .....	15
Section 2.1.1: The Recruitment Context.....	15
Section 2.1.2: Predictor Choice .....	16
Section 2.1.3: The Job Performance Domain .....	18
Section 2.1.4: Predictor Coverage of the Job Performance Domain .....	20
Section 2.1.5: Combining Predictors .....	23
Section 2.1.6: Adverse impact.....	25
Section 2.2: Integrity.....	29
Section 2.2.1: The Integrity Construct.....	30
Section 2.2.2: Integrity Test Prediction of Job Performance .....	36
Section 2.3: Personality.....	40
Section 2.3.1: Personality Traits.....	42
Section 2.3.1.1: The Big Five Personality Model .....	45
Section 2.3.2: Personality Trait Prediction of Job Performance.....	47
Section 2.3.3: Relationship of Personality Traits to Integrity.....	52
Section 2.4: Intelligence.....	57
Section 2.4.1: The Intelligence Construct.....	60
Section 2.4.2: Intelligence Test Prediction of Job Performance.....	65
Section 2.4.3: Relationship of Intelligence to Integrity .....	67
Section 2.4.4: Relationship of Intelligence to Personality Traits .....	69
Section 2.5: Response Time (RT).....	72
Section 2.5.1: Response Time as Response Style.....	73
Section 2.5.2: Response Time and Time Management .....	74
Section 2.5.3: Response Time Relationship with Individual Differences .....	76
Chapter 2 Summary .....	78

Chapter 3: Research Objectives .....	80
Section 3.1: Relationships among Integrity, Conscientiousness, Neuroticism, and Ability.....	80
Section 3.2: Adverse Impact Risk and Reduction for those identifying as Māori .....	81
Section 3.3: Response Time.....	81
Chapter 4: Study 1 .....	83
Section 4.1: Method .....	83
Section 4.1.1: Participants (Study 1) .....	84
Section 4.1.2: Measures (Study 1).....	86
Section 4.1.2.1: The General Reasoning Test Battery (GRT2).....	86
Section 4.1.2.2: The Fifteen Factor Questionnaire – Second Edition (15FQ+) .....	90
Section 4.1.2.3: Stanton Survey of Integrity (SSI).....	93
Section 4.1.3: Procedures (Study 1).....	97
Section 4.1.4: Analyses (Study 1).....	98
Section 4.2: Results (Study 1).....	101
Section 4.2.1: Descriptive Statistics .....	101
Section 4.2.2: Relationships among Integrity, Conscientiousness, Neuroticism, and Ability....	103
Section 4.2.2.1: Correlation Coefficients .....	103
Section 4.2.2.2: Significance of Correlation Coefficient Differences.....	106
Section 4.2.2.3: Multiple Regressions.....	107
Section 4.2.3: Adverse Impact Risk and Reduction for those identifying as Māori.....	109
Section 4.2.3.1: Mean Score Differences .....	109
Section 4.2.3.2: Adverse Impact Reduction Calculations .....	110
Section 4.3: Discussion (Study 1) .....	112
Section 4.3.1: Relationships among Integrity, Conscientiousness, Neuroticism, and Ability....	112
Section 4.3.2: Adverse Impact Risk and Reduction for those identifying as Māori.....	120
Section 4.3.3: Specific Limitations.....	123
Section 4.3.4: Future directions .....	124
Section 4.3.5: Summary.....	124
Chapter 5: Study 2.....	126
Section 5.1: Method .....	127
Section 5.1.1: Participants (Study 2) .....	127
Section 5.1.2: Measures (Study 2).....	129
Section 5.1.2.1: Personality Item Construction.....	131
Section 5.1.2.2: Cognitive Ability Item Specification and Writing .....	134
Section 5.1.3: Procedures (Study 2) .....	135
Section 5.1.4: Analysis (Study 2) .....	137
Section 5.2: Results (Study 2).....	144
Section 5.2.1: Item-level Analysis.....	145

Section 5.2.1.1: Descriptive Statistics .....	145
Section 5.2.1.2: Item Discrimination Power .....	151
Section 5.2.1.3: Item Difficulty Indices .....	155
Section 5.2.1.4: Item Distractor Analysis.....	156
Section 5.2.2: Scale-level Analysis .....	159
Section 5.2.2.1: Validity Check.....	159
Section 5.2.2.2: Reliability Check.....	168
Section 5.2.3: IRT Calibration of Retained Ability Items .....	169
Section 5.2.4: Refined Scale Characteristics .....	176
Section 5.2.5: Relationships among Integrity, Conscientiousness, Neuroticism, and Ability....	178
Section 5.2.5.1: Correlation Coefficients .....	178
Section 5.2.5.2: Significance of Correlation Coefficient Differences.....	179
Section 5.2.5.3: Multiple Regressions.....	179
Section 5.2.6: Adverse Impact Risk and Reduction for those identifying as Māori.....	180
Section 5.2.6.1: Mean Score Differences .....	181
Section 5.2.7: Response Time .....	181
Section 5.2.7.1: Response Time, Ability, and Item Difficulty .....	182
Section 5.2.7.2: Response Time and Personality Traits .....	184
Section 5.3: Discussion (Study 2) .....	187
Section 5.3.1: Relationships among Integrity, Conscientiousness, Neuroticism, and Ability....	187
Section 5.3.2: Adverse Impact Risk and Reduction for those identifying as Māori.....	190
Section 5.3.3: The relationship between response time, respondent ability, and item difficulty.	190
Section 5.3.4: Composite Assessment Development Outcomes and Implications.....	195
Section 5.3.5: Specific Limitations.....	197
Section 5.3.6: Future directions .....	199
Section 5.3.7: Summary.....	201
Chapter 6: Integration and Conclusions .....	203
Section 6.1: Relationships among Integrity, Conscientiousness, Neuroticism, and Ability.....	203
Section 6.2: Adverse Impact Risk and Reduction for those identifying as Māori .....	206
Section 6.3: Response Time.....	207
Section 6.4: General Limitations .....	208
Section 6.4.1: Design.....	209
Section 6.4.2: Generalisability.....	210
Section 6.4.3: Analyses and statistical power.....	210
Section 6.4.4: Measurement .....	211
Section 6.5: Future directions .....	212
Section 6.6: Final Thoughts .....	212
References .....	216

Appendix A: Items Retained Subsequent to Piloting .....	257
Appendix B: Participant Information and Consent .....	266
Appendix C: Oblique Factor Rotations: .....	268
Appendix D: IRT Assumptions and ICCs: .....	277

## List of Tables and Figures

Figure 2.1. Relationships between Performance Predictors and the Performance Domain .....	21
Figure 2.2. Integrity, Conscientiousness, and Job Performance Relationships .....	38
Table 2.1. 15FQ+ Big Five Model of Personality Bi-Polar Dimensions .....	46
Table 2.2. 15FQ+ Big Five Model of Personality Facet Traits .....	51
Figure 2.3. CHC Hierarchical Model of Intelligence .....	65
Table 4.1. Demographic Statistics (Study 1).....	85
Table 4.2. 15FQ+ Facet Traits.....	91
Table 4.3. Descriptive Statistics for 15FQ+, SSI, and GRT2 Dimensions.....	102
Table 4.4. Correlation Matrix for 15FQ+ Global factors, the GRT2, and the SSI.....	103
Table 4.5. Correlation Matrix for 15FQ+ primaries, the GRT2, and SSI .....	104
Table 4.6. $\beta$ values for Multiple Regression Coefficients of Personality Traits on Integrity.....	108
Table 4.7. Comparison of Māori and broader participant group Means and Standard Deviations .....	110
Table 5.1. Demographic Statistics (Study 2).....	128
Table 5.2. Example Scale Items .....	130
Table 5.3. Descriptive Statistics for Crystallised Intelligence Items.....	146
Table 5.4. Descriptive Statistics for Fluid Intelligence Items .....	147
Table 5.5. Descriptive Statistics for Integrity Items.....	148
Table 5.6. Descriptive Statistics for Conscientiousness Items .....	149
Table 5.7. Descriptive Statistics for Neuroticism Items.....	150
Table 5.8. Descriptive Statistics for Dissimulation Items .....	151
Table 5.9. Crystallised and Fluid Intelligence CITCs and Discrimination Indices .....	152
Table 5.10. Item Discrimination Power for Conscientiousness and Neuroticism.....	153
Table 5.11. Item Discrimination Power for Integrity and Dissimulation.....	154
Table 5.12. Difficulty Indices for Crystallised and Fluid Ability Items.....	155
Table 5.13. Crystallised Item Distractor versus Correct Response-Option Analysis.....	157
Table 5.14. Fluid Item Distractor versus Correct Response-Option Analysis .....	158
Figure 5.1. Fluid and Crystallised Intelligence Items Scree Plot. ....	161
Table 5.15. Cognitive Ability Rotated Matrices .....	163
Figure 5.2. Personality Item Scree Plot. ....	164
Table 5.16. Personality Rotated Matrices.....	166
Table 5.17. Cronbach's Alpha for Retained items .....	169
Table 5.18. Cronbach's Alpha Comparison between Males and Females .....	169
Table 5.19. Crystallised Intelligence Parameter Estimates .....	171
Figure 5.3. ICCs for Most and Least Discriminating Crystallised Ability Items.....	172
Figure 5.4. ICCs for Most and Least Difficult Crystallised Ability Items. ....	172

Table 5.20. Fluid Intelligence Parameter Estimates .....	173
Figure 5.5. ICCs for Most and Least Discriminating Fluid Ability Items.....	174
Figure 5.6. ICCs for Most and Least Difficult Fluid Intelligence Items. ....	174
Figure 5.7. Crystallised Ability Total Information Function. ....	175
Figure 5.8. Fluid Ability Total Information Function. ....	176
Table 5.21. Scale Score Means and Standard Deviations .....	177
Table 5.22. Fluid and Crystallised Intelligence Refined versus Raw Scale Scores .....	177
Table 5.23. Personality Refined versus Raw Scale Scores.....	177
Table 5.24. Inter-scale Correlations .....	178
Table 5.25. $\beta$ values for Multiple Regression Coefficients of Personality Traits on Integrity.....	180
Table 5.26. Comparison of Māori and broader Participant Means and Standard Deviations .....	181
Table 5.27. Relationships between Respondent Ability and Response Latency.....	182
Table 5.28. Relationships among Crystallised Item Difficulty Indices and Response Latencies .....	183
Table 5.29. Relationships among Fluid Item Difficulty Indices and Response Latencies .....	184
Table 5.30. Conscientiousness, Neuroticism, and Ability Response Latency Relationships.....	185
Table 5.31. Relationships among Neuroticism Factors and Response Latencies on Ability .....	185
Table A1. Retained Integrity Items .....	257
Table A2. Retained Conscientiousness Items .....	258
Table A3. Retained Neuroticism Items .....	259
Table A4. Retained Dissimulation Items.....	260
Table A5. Retained Crystallised Intelligence Items .....	261
Table A6. Retained Fluid Intelligence Items.....	263
Table C1. Cognitive Ability Pattern Matrices.....	269
Table C2. Cognitive Ability Structure Matrices.....	270
Table C3. Cognitive Ability Principal Axis Factoring Correlation Matrices.....	270
Table C4. Personality Pattern Matrices .....	272
Table C5. Personality Structure Matrices.....	274
Table C6. Personality Principal Axis Factoring Correlation Matrices.....	276
Table D1. IRT Model-Data Fit for Crystallised and Fluid Intelligence Items .....	277

*Note.* The first numeral within Figures and Tables denotes the section of presentation and the second numeral denotes presentation order within section.