Inspection Time as a Biological Marker for Functional Age

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October 2006

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ABSTRACT

Inspection Time (IT) is a speed measure that has been primarily investigated in the field of individual differences. However, Nettelbeck and Wilson (2004) proposed that IT could have promise as a biomarker for functional outcomes, particularly cognitive aging. The premise behind biomarker research is that chronological age is simply a proxy for the physiological and cognitive changes that occur in the body with advancing age. Biomarkers are measures that 'mark' the aging process and represent the biological age of an individual rather than the years since his/her birth. Speed of processing tasks offer promise as biomarkers because decline in speed of processing is one of the most robust findings in cognitive aging research. However, traditionally used tasks are problematic because they confound speed and accuracy and some are sensitive to cohort effects. Inspection time is a speed of processing measure that is free from these problems and is therefore a promising candidate for a biomarker. This dissertation presents the first empirical investigation of this proposition.

One hundred and fifty elderly participants were assessed on IT, traditionally used biomarkers (e.g. grip strength, visual acuity), a battery of cognitive tasks (e.g. fluid ability and crystallised ability) and measures of everyday functioning (e.g. activities of daily living). These individuals were assessed on three separate occasions over a period of 18-months. For the biomarkers, initial scores, 6-month change scores and 18-month change scores were generated and used to predict final scores and 18-month change scores on the functional outcomes (cognition and everyday functioning). Results revealed that slow IT at the start of the study was associated with dependence in activities of daily living and poorer fluid ability at the end of the study. There was also evidence that slow IT at the start was associated with decline in fluid reasoning over the subsequent 18-months. Moreover, consistent with the major aims of this study, decline in IT over time was associated with more cognitive problems in daily life and poor fluid ability at the end of the study. Given that initial and change scores for IT were independent, due to the methodology used to estimate them, the two measures explained unique variance in the functional outcome measures.

These findings are extremely encouraging, particularly given the relatively short time frame for this study. IT has predictive validity for everyday functioning and cognitive aging over an 18-month period, and therefore, it is concluded that IT has promise as a valid biomarker for functional age. Recommendations for further research include investigating the link between IT and mortality, examining the association between IT and a broader range of functional age measures, the replication of these findings in a different sample, and means for improving the sensitivity and specificity of the current IT estimation procedure.

DECLARATION

This thesis contains no material which has been accepted for the award of any other degree or diploma in any university or other tertiary institution and, to the best of my knowledge and belief, contains no material previously published or written by another person, except where due reference has been made in the text.

I give consent to this copy of my thesis, when deposited in the University Library, being made available in all forms of media, now or hereafter known.

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Tess A. Gregory Date

ACKNOWLEDGEMENTS

First, I would like to thank my supervisor Professor Ted Nettelbeck from the University of Adelaide I sincerely appreciate the time you have taken to read through my draft chapters, the many useful recommendations that you have made throughout my dissertation, and for the encouragement to attend international conferences and meet with researchers in this field, which has made the PhD experience much more rewarding.

Second, I would like to thank my supervisor Dr. Carlene Wilson from CSIRO, who presented this idea to me as a potential PhD project. While difficult at times, the investigation of IT as a biomarker ended up being an excellent PhD project and I appreciate being given the chance to work on it. I appreciate the many useful comments you have provided on my drafts and the suggestions about alternative statistical procedures to use throughout.

Third, I would also like to acknowledge the CSIRO for providing additional funding for my PhD and financial assistance for travel. I would also like to thank CSIRO for the use of their nutritional databases to analyse the nutritional data and for help with computer issues on this project.

Fourth, I would like to acknowledge Sara Howard who assisted in collecting the longitudinal data for this project, and made this great dataset possible. I also appreciate the many discussions on the theoretical issues involved in this project and the emotional aspects of completing a PhD project.

Fifth, I would like to thank all of the participants who were involved in this research project. The four-hour testing sessions were time-consuming and required intense concentration and perseverance. This research would not be possible without you and I offer my sincere thanks for your time and interest in my research.

Thanks must also go to the numerous researchers who offered advice throughout this project on psychometric tests, questionnaires, statistical procedures and relevant conferences to attend. These include Dr Nick Burns, Dr Janet Bryan, Dr Kaarin Anstey, Professor Ian Deary, Professor Timothy Salthouse, and Dr Linley Denson, to name a few.

Finally, I would like to thank my husband Shanan Gregory for the support he has given me during the past four years. I appreciate the many discussions on theoretical issues surrounding biomarkers and functional age and your ideas about the causes of some of the more unusual findings in my dataset. I would like to thank you for the emotional support and encouragement you have given me, particularly in the past 6-months.

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KEY TO ABBREVIATIONS

ADL	Activities of Daily Living
ADAS-Cog	Alzheimer's Disease Assessment Scale - Cognitive
BP	Blood Pressure
CA	Chronological Age
CCFT	Cattell Culture Fair Test
CDL	Cognition in Daily Life
CF	Concept Formation
CNS	Central Nervous System
DS	Digit Symbol
FA	Functional Age
Gc	Crystallised Ability
Gf	Fluid Ability/ Reasoning
Gs	Speed of Processing
IT	Inspection Time
PC	Pattern Comparison
RSPM	Raven's Standard Progressive Matrices
VA	Visual Acuity
VM	Visual Matching