
**Neuropsychological Cross Cultural Study of
Cognitive Performance of Greek Australian Elderly and
Exploration of Diagnostic Challenges**

Areti Plitas

BA, BAppSc(Hons)Psych



School of Psychology
Victoria University
Melbourne, Australia

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"...a very limited kind of neuropsychology, appropriate to only a fraction of the world's population, is presented to the rest of the world as if there could be no other kind of neuropsychology, and as if the education and cultural assumptions on which neuropsychology is based were obviously universals that applied everywhere in the world." (Matthews, 1992; p. 421)

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Abstract

In the area of dementia diagnosis and assessment of cognitive functioning of elderly culturally and linguistically diverse individuals (CALDI) little is known about cognitive test performance differences between migrants and peers from their country of origin. Although Australia is known for its multicultural society and Greek is one of the most common languages spoken at home, few studies have compared cognitive test performance between migrants to peers from their country of origin. This study investigated whether the long-term migrant group of elderly Greek-Australians (GA) performance on tests of cognition was comparable to demographically similar group of elderly Greek Nationals (GN). Based on available cross cultural literature it was hypothesised that GA would obtain lower scores on tests of cognition compared to GN due to issues relating to the migrant experience such as acculturation, reduced language fluency and proficiency. The tests used in the current study are used internationally as screening measures of cognitive functioning, assist with the diagnosis of dementia, and assess depression in the elderly. These tests had been normed in Greece and raw data was obtained from Greek researchers to allow for direct comparison between GA and GN. Participants cognitive functioning was assessed on the Cambridge Cognitive Examination of the Elderly (CAMCOG) and the Mini Mental Status Examination (MMSE). The Geriatric Depression Scale (GDS) was administered in order to exclude possible confounding factor of mood on cognitive test performance. The GA participants comprised of 66 healthy, community dwelling, individuals recruited from Melbournian Greek social clubs. They were aged between 56 and 88 years (group mean age = 66.2 years, $SD = 6.3$). The GN participants were recruited by Greek researchers from the 3rd Department of Neurology, Aristotle University Hospital of Thessaloniki and consisted of 76 GN participants without dementia (Gn), 66 GN participants with clinical diagnoses and cognitive symptomatology (GID), and 97 GN participants with dementia (GD). Gn participants were aged between 55 and 93 years (group mean age = 69.8 years, $SD = 7.5$). Although there were no significant differences between the groups in terms of gender, GA participants were significantly younger than Gn and GD, and GA were significantly more educated than the GD group. GA responses on the GDS indicated minimal

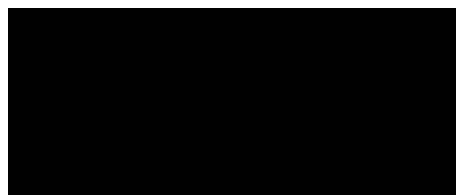
depressive symptomatology, which was not considered to be indicative of depression. The results of the current study supported the hypotheses that GA would obtain lower scores on tests of cognition, as measured by the CAMCOG and MMSE, compared to demographically similar group of non demented GN. In addition, there was a significant interaction effect of gender; GA females obtained significantly lower scores than GA males on CAMCOG and MMSE. Given the findings of the present study it was concluded that caution be exercised when applying GN CAMCOG and MMSE norms to GA as these norms could result in false positives, that is GA could be inaccurately diagnosed as cognitively impaired and demented according to GN norms. Current findings also indicate that GA females are at a higher risk of being inaccurately diagnosed. The significance of these findings regarding CALDI assessment of cognitive functioning, in particular the risk of diagnostic inaccuracy when applying norms from migrants' country of origin and norms developed from English speaking individuals, the utility of the CAMCOG and MMSE with GA, and implications for future research were also examined.

Declaration

“I, *Areti Plitas*, declare that the Doctor of Psychology (Clinical Neuropsychology) thesis entitled *Neuropsychological Cross Cultural Study of Cognitive Performance of Greek Australian Elderly and Exploration of Diagnostic Challenges* is no more than 40,000 words in length, exclusive of tables, figures, appendices, references and footnotes. This thesis contains no material that has been submitted previously, in whole or in part, for the award of any other academic degree or diploma. Except where otherwise indicated, this thesis is my own work”.

“I further declare that the present study adheres to the ethical principles as established by the Research Ethics Committee of the School of Psychology – Victoria University.”

Signature: ...

A solid black rectangular box redacting the signature of the author.

Date:

14/08/07

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CHAPTER 1

Introduction

CHAPTER 1: INTRODUCTION

1.1 Overview of Current Study

Neuropsychologists play an integral role in dementia assessment and in the diagnosis of cognitive disorders due to their expertise in understanding the relationship between brain function and behaviour. Neuropsychologists utilise sophisticated reliable psychometric tests of cognition that are sensitive to brain function and brain changes. They are trained to interpret performances on tests of cognition and are able to differentiate between a healthy cognitive profile, and disturbances in cognition due to an illness or disease process. Accurate neuropsychological assessment is essential in dementia diagnosis as it is the best means possible of distinguishing between age-related and disease related cognitive changes.

Although the accuracy of current neuropsychological assessment procedures have been well documented within educated individuals from western post industrial countries, cross cultural psychology findings indicate that these procedures may not be universally applicable across individuals from culturally and linguistically diverse (CALD) backgrounds. This question regarding universality has arisen because numerous studies, over an extended period of time, have reported cognitive test performance differences between individuals from western developed countries and CALD individuals (CALDI). Of particular concern regarding the accuracy of current neuropsychological assessment

procedures in CALD clients, are more recent study findings reporting that healthy elderly CALDI have performed within the impaired range on measures of cognition.

Attitudes towards cross cultural assessment of cognitive functioning and diagnosis have changed over time with the acquisition of knowledge regarding cognitive test performance by various CALD groups. This body of knowledge has arisen from research conducted by various scholastic fields such as anthropology, linguistics, education and psychology. Given the diversity of the scientific fields contributing to this body of knowledge unfortunately research regarding CALDI performance on tests of cognition has been fragmented. Due to this fragmented approach certain groups, such as Spanish Americans and African Americans, and certain variables, such as education and performance based assessments have received more attention than other CALD groups and other variables. However, neuropsychological test performance of CALDI can be influenced by a range of variables, including differences in test taking behaviours, cultural and linguistic inadequacy in test translation and adaptation of tests, as well as language fluency and proficiency, level of education and level of literacy, cognitive styles and length of residence of CALDI in the new country.

Where linguistically appropriate tests are available to assess a bilingual migrant, due to cross cultural research reports of test performance differences between cultural groups, the clinician may apply norms from the client's country of origin to improve diagnostic accuracy. However, a relatively developing field of enquiry in cross cultural research suggests that the same criteria should not be used to compare individuals living in their

country of origin to those who have relocated to a different culture because of acculturation factors, as well as issues relating to the migrant experience such as reduced language fluency and code switching.

Australia is known for its multicultural society and according to the Australian Bureau of Statistics 2001 Census, Greek is the third most common language spoken at home other than English. To the best of the author's knowledge no previous study has compared the cognitive test performance of Australian migrants to peers from their country of origin. This is a significant issue due to the ageing of the post Second World War migrants that are now moving into late adulthood and are at increased risk of cognitive illnesses such as dementia. This study was designed to investigate whether the long-term migrant group of Greek-Australians (GA) was comparable to demographically similar group in the country of origin, by examining the cognitive characteristics of elderly Greek migrants in Australia and comparing these to elderly Greek Nationals (GN) on tests of cognition. The tests of cognition used in the current study were normed in Greece and allowed for direct comparison between the two groups. Greek researchers provided the raw data on the following tests: Cambridge Cognitive Examination of the Elderly (CAMCOG) which is used internationally to assist with the diagnosis of dementia; the Mini Mental Status Examination (MMSE) which is also used internationally to screen for dementia; and the Geriatric Depression Scale (GDS), an international scale used to assess depression within the elderly was also administered.

The following sections provide a background for the present study by reviewing the relevant cross cultural literature findings relating to CALDI cognitive test performance. This review includes key historical issues about test development, test usage, and conclusions made regarding CALDI performance based on tests of cognitive functioning. In addition, key cross cultural theoretical concepts and research findings have also been reviewed. Whilst as much structure as possible was applied in presenting this information, given that cross cultural research has evolved over considerable time and has been approached in a fragmented manner by various scholastic groups, and that some issues are interrelated, at times this attempt at cohesion was difficult to achieve. However, it is hoped that by reviewing all of these facets of cross cultural assessment that this will enable a greater understanding of how to best approach neuropsychological assessment and diagnosis of dementia and cognitive impairment within CALD groups.

1.2 Dementia Assessment and Neuropsychology

Within clinical neuropsychology practice, understanding the factors that impact upon the cognitive performance of CALDI, as well as being able to interpret accurately cognitive test results is an increasingly important issue, especially in the field of diagnosis of cognitive disorders. This is particularly important in the diagnosis of dementia, because neuropsychologists play an integral role in this field within Australia and internationally. In addition, cross cultural assessment issues tend to be more prevalent in late adulthood migrant groups, because typically these groups of migrants were not able to attend formal schooling in their country of origin and their proficiency in English also tends to be limited. Given Australia's multicultural society, increased awareness, understanding and

investigation of cross cultural assessment issues is both warranted and needed. The first section of this review gives an overview of the definition of dementia, diagnostic issues, pathophysiology and neuropsychological assessment and diagnosis of dementia.

1.2.1 Definition of Dementia

The term dementia describes a group of symptoms that are caused by changes in brain function. Dementia is a progressive and irreversible loss of intellectual function that eventually impairs an individual's ability to work, socialize and carry out activities of daily living. Areas of cognitive functions affected include impaired memory, learning ability, judgment and capacity for abstract thought, as well as difficulties in a range of other thinking skills including concentration and attention, expressive language skills, visuospatial skills and problem solving skills. In addition, dementia can also result in mood, personality and behavioural changes (Jones & Richardson, 1990). There are various dementia subtypes and symptoms vary, however, functionally individuals with dementia are likely to display symptoms such as asking the same questions repeatedly; losing possessions; becoming lost in familiar places; being unable to follow directions; being disoriented to time, person, and place; and neglecting personal safety, hygiene, and nutrition (Jones & Richardson, 1990).

1.2.2 Diagnosis of Dementia

Because there is no biological marker for dementia a conclusive diagnosis requires examination of the brain tissue for characteristic lesions post-mortem. Alzheimer's Disease (AD) is the most common of all primary dementias. Progression of AD is slow

and its onset is insidious, starting with mild memory problems and ending with severe brain damage. People with dementia lose their abilities at different rates. On average, AD patients live from 8 to 10 years after they are diagnosed, though the disease can last for as many as 20 years (Carr, Goate, Phil, & Morris, 1997). It is estimated that the prevalence of dementia is approximately 1% for people less than 65 years of age, approximately 1.4% for people between 65-69 and approximately 24% for adults over the age of 85 years. Hence, the prevalence of dementia doubles about every five years for an adult over 65 years of age (Katona & Robertson, 1995).

The defining characteristics of AD are large numbers of neurofibrillary tangles (tangled bundles of fibers) and amyloid plaques (abnormal clumps) located inside the brain, which initially involve the areas of the brain that are important for memory, language, and thought. This leads to nerve cell death and neuron loss in areas of the brain that are vital to memory and other abilities, as well as disrupted connections between nerve cells. There are also chemical brain changes, in that there are lower levels of some of the chemicals in the brain that carry messages back and forth between nerve cells. AD is also thought to impair thinking and memory by disrupting these messages (Blass, 1993).

Neurofibrillary tangles are twisted pairs of helical filaments found within the neurons, they are similar to microtubules, normal cell structures that allow neurotransmitters and other protein made within the cell body to be transported to other regions of the cell. Because of their structure, it has been hypothesized that neurofibrillary tangles disrupt a neuron's structural matrix. Although neurofibrillary tangles can be found in the brain of a

healthy older individual, they are greatly increased in number in the cortex of an individual with AD. These neurofibrillary tangles are more commonly located in the limbic system, medial temporal, inferior parietal and frontal regions of the brain. It has been postulated that the presence of neurofibrillary tangles in the medial temporal areas may functionally disconnect the hippocampus from the rest of the cortex. Tangles are also found in brain regions that contain cell bodies for some of the major neurotransmitter systems, for example the basal forebrain nuclei and brain stem nuclei including the locus coeruleus and the raphe nucleus, which are implicated in memory functioning (Banich, 1997; Blass, 1993).

Amyloid plaques are deposits of proteins and are typically surrounded by neurons containing neurofibrillary tangles and are believed to cause vascular damage and neuronal cell loss. As with neurofibrillary tangles, amyloid plaques are also found in the brain of a healthy older individual without dementia. However, in individuals with AD there are an increased number of amyloid plaques, which tend to concentrate in the cortex and the hippocampus and are sometimes found in the basal ganglia, thalamus and cerebellum. The neurofibrillary tangles and amyloid plaques cause cell loss, which at later stages of the disease can be seen on anatomical brain images as cerebral atrophy and ventricular expansion (Banich, 1997; Campion, 1996).

1.2.3 Neuropsychological Assessment and Diagnosis of Dementia

The diagnosis of dementia is made in conjunction with a detailed clinical history of cognitive changes and with a thorough medical evaluation, to rule out any other treatable

causes of the presenting cognitive difficulties. The importance of neuropsychological assessment in the diagnosis of dementia is evident from two of the most widely used sets of criteria for diagnosis, the United States' National Institute of Neurological and Communicative Disorders and Stroke-Alzheimer's Disease and Related Disorders Association (NINCDS-ADRDA) criteria for the clinical diagnosis of AD (Whitehouse, Lerner & Hedera, 1994) and for diagnosing dementia the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV TR) of the American Psychiatric Association (2000). Both sets of criteria emphasise the need to identify disturbances of cognitive function such as aphasia, apraxia, agnosia and that cognitive impairment is evident in short and long term memory, abstract thinking and judgment (Reid, 1994). Hence, neuropsychological assessment must include tests that will provide reliable clinical data with which neuropathological and neurochemical brain changes can be correlated. Particularly as healthy older adults demonstrate an age-related reduction in cognitive functions such as psychomotor speed, attention, memory, language, visuospatial abilities, and logical problem solving. Although in healthy older persons these changes typically do not interfere substantially with activities of daily living (Carr, Goate, Phil, & Morris, 1997; La Rue, 1992). During the early stage of dementia, where a mild reduction in cognitive functions occurs, it is extremely difficult to distinguish between age-related cognitive changes and disease related cognitive changes.

Accurate assessment of cognitive impairment requires neuropsychological testing, as neuropsychological assessment provides an objective measure of cognitive function and allows for the comparison of cognitive performances with healthy age matched

individuals. Neuropsychological testing not only assists in making a clinical diagnosis based on standard criteria for dementia, it can also provide a baseline of abilities from which to monitor change in cognitive functioning over a period of time. This is particularly useful in dementia assessment and diagnosis, which requires evidence of a gradual decline of cognitive function over time. In addition, neuropsychological testing can identify specific areas of intact, as well as impaired, cognitive functions and may also provide information relevant to the individual's everyday activities and level of functioning. Reliable and valid neuropsychological tests with demographically accurate norms are essential in dementia diagnosis as they are the best means of distinguishing between age-related and disease related cognitive changes (Cullum & Huppert, et al., 2000).

In Australia most tests used during a neuropsychological assessment have generally been developed for and by either Americans or British. Most of these tests have been adapted, with some minor content changes and local norms, to accommodate Australian culture. Numerous studies have demonstrated that generally speaking, and given minor content changes to test items, Caucasian members of these English speaking western societies perform comparatively (Ogden, 2001; Crawford, Gray & Allan, 1995; O'Connor, Pollitt, Hyde, & Fellows, 1989; Gibbons & Van Belle, et al., 2002; O'Connor, Blessed, Cooper, & Jonker, 1996; Clark, Dennerstein, Elkadi, Guthrie, Bowden, & Henderson, 2004a, 2004b; Worrall, Yiu, Hickson, & Barnett, 1995; Crook, Youngjohn, Larrabee & Salama, 1992). In contrast, CALDI performance on cognitive tests tends to vary considerably between different groups, and between different tests of cognition or areas of cognition,

as well as, within certain groups (Neisser et al., 1996). In order to appreciate the factors that are considered to mediate the accuracy of current neuropsychological tests in assessing CALDI cognitive performance, and the accuracy in diagnosing dementia, it is appropriate to review the historical setting which led to the development of current tests and assessment processes, that are being used by developed nations such as United States of America (U.S.A.) and Australia. This review shall be presented in the next section.

In summary, neuropsychologists play an integral role in dementia assessment and in the diagnosis of cognitive disorders due to their expertise in understanding the relationship between brain function and behaviour. Accurate neuropsychological assessment is essential in dementia diagnosis as it is the best means of distinguishing between age-related and disease related cognitive changes. Researchers have reported that CALDI performance on cognitive tests tends to vary considerably between different groups, and between different tests of cognition or areas of cognition, as well as, within certain groups. Given Australia's multicultural society increased awareness, understanding and investigation of the factors that influence CALDI performance on tests of cognition is both warranted and needed in order to improve diagnostic accuracy of current assessment procedures.

1.3 Theoretical Orientation and Development of Cognitive Tests

Testing has been reported to have had its origins in antiquity, for instance ancient Greeks (such as Socrates and Hippocrates in 400 BC and Aristotle in 300 BC) attempted to measure differences between the psychological characteristics of individuals. However,

contemporary developments in psychological testing occurred in the 19th Century when psychometric advances were made by French, British and American physicians and psychologists (Anastasi, 1988). Given that neuropsychology relies heavily on cognitive tests, in diagnosis of cognitive impairment and dementia, it is important to understand the history and development of these tests. The focus of this section is to review the theoretical orientation and historical context that lead to the development of cognitive tests that are being currently used to assess cognitive functioning.

1.3.1 Scholastic Origins of Cognitive Tests

In France during the mid-1800's, tests were developed for the assessment of cognitive and perceptual abilities for training cognitively impaired children. In 1884, British scientist Sir Galton developed a set of anthropometric measures, such as line bisection and digit span that were administered to persons attending the 1884 International Health Exhibition in London. He tried to demonstrate that the human mind could be systematically mapped into different cognitive dimensions. He studied how people differed in terms of their ability to discriminate between stimuli and by collating his results, he devised a system which would allow an individual's abilities to be compared to those of others.

In 1890, American psychologist Cattell popularised the term mental test and adapted Sir Galton's tests for research with American college students. Cattell developed a set of sensorimotor tests (such as measures of strength, reaction time, sensitivity to pain, and weight discrimination), which were used to measure the intellectual level of college

students (Murphy & Davidshofer, 1998). In 1905, psychologists Binet and Simon published tests used to measure intelligence, which had been developed for use with Parisian school children in an effort to assist children who had difficulty learning in the classroom (Samuda, Feuerstein, Kaufman, Lewis, & Sternberg, 1998). This selection of tests included measures of language skills (e.g., naming, following commands, semantic judgements) memory, reasoning, digit span, and psychophysical judgements. Validity of this intelligence scale was demonstrated by the increase of scores with age and by the scale's ability to differentiate normal and cognitively impaired children (Peterson, 1925; cited in Boake, 2002). This test was revised in 1908 to include both verbal and non-verbal tests. It became widely used in Europe and North America and was later translated into English and used in American institutions. It was later restructured by American psychologists from a year scale into a point scale, the age range was extended to adulthood and, most importantly, mental age was replaced with an intelligence quotient. The Binet and Simon scales have since served as both a model of form, and source of content of items and tests, that have been reused in later intelligence tests such as the Wechsler intelligence scales (Boake, 2002).

1.3.2 Adaptation of Scholastic Tests for Cognitive Assessment of Adults

The development of adult intelligence tests was also prompted in the early 1900's by American psychologists who used tests to assess whether U.S.A. army recruits were fit for military service during the First World War. The main army intelligence tests, administered by trained psychological examiners, were Group Examinations Alpha (designed for the assessment of literate English speakers) and Beta (designed for the

assessment of the minority of recruits who were illiterate or not proficient in English). Also during that time the need for non-verbal measures of intelligence was expressed by clinicians examining subjects with limited English-language skills, and this led to the development of pictorial completion tests, which were initially used to assess juvenile delinquents. This method of measuring intelligence using nonverbal tasks came to be termed performance testing. Performance testing consisted of various board and puzzle assembly tasks. As many immigrants spoke no English and had little or no formal education, these performance tasks were used to screen immigrants arriving in the U.S.A. for mental and physical disorders, however none of the tests were standardized. Following the example of the immigrant testing program a Performance Scale for assessment of hearing impaired school children was developed. Interestingly, some of the Performance Scale test components are still in use today, for example the beginning item of the Object Assembly subtests of the Wechsler intelligence scales (Boake, 2002; Richardson, 2003).

David Wechsler, the creator of the Wechsler intelligence scales, was also a wartime psychological examiner. He assessed recruits that could not be evaluated with group army tests and instead administered the Army Performance Scale Examination to individuals. He later worked with a broad range of innovators and theorists of individual differences and intelligence, including Spearman, Pearson, Cattell, and Thorndike. He became the Chief Psychologist at Bellevue Psychiatric Hospital in New York City in 1932. Wechsler noted that there were a number of limitations of cognitive tests in use at that time. Limitations included that the tests were originally created to measure scholastic/academic

potential, were directed toward children, and tended to be highly verbal in the type of intelligence they measured. In addition, age-derived norms were considered inappropriate for adults who were not generally included in test standardization samples. Rather than create new tests of cognition, Wechsler assembled an adult-focused test of intelligence, which incorporated some of Binet's original verbal and more academic tests with performance tests, and used standardized scores at each age level. Thus, the original Wechsler-Bellevue examination in 1939 was developed based on his understanding of intelligence as combining both a general factor and a set of distinctive cognitive abilities. He believed intelligence was demonstrated by a person's ability to act purposefully, think logically, and interact or cope successfully with the environment (Flanagan & Harrison, 2005; Anastasi, 1988; Boake, 2002).

1.3.3 Current Theoretical Constructs of Tests of Cognition and Practice Assumptions

Neuropsychologists place much emphasis on the psychometric properties and normative data of tests. Given the profusion of cognitive tests there is variability in the psychometric properties of tests of cognitive functioning. The Wechsler scales have set the standard in psychometric properties of neuropsychological tests of intelligence and tests of cognitive abilities (Spren and Strauss, 1998). The current Wechsler Adult Intelligence Scale – Third Edition (WAIS-III) is considered to have a high standard of psychometric properties, and norms have been developed from a large standardization sample which was stratified according to age, gender, race/ethnicity, education level and geographic region (see WAIS-III Technical Manual, The Psychological Corporation, 1997). Although neuropsychologists are educated about the psychometric properties of tests and

are educated as to how to identify which are appropriate measures of cognition, there is comparatively relatively little education and training regarding the theoretical and historical context from which cognitive tests in Western societies developed. In particular, attention is rarely called to the fact that current tests of cognition stem from the same theoretical constructs which were used to develop psychometric tests in the 1800's and the 1900's (Boake, 2002).

Current cognitive assessment practice makes the assumption that the theoretical orientation of cognitive tests, and procedural application of these tests, can be universally applied across CALDI. A secondary assumption is that poor performance on tests of cognition by CALDI reflects reduced brain function (Nell, 2000; Artiola i Fortuny, 2004). However, as will be indicated in the next section, CALDI may perform poorly on such tests for other reasons not related to brain function. As such, these underlying assumptions may not only jeopardize the accuracy of current assessment processes in CALDI, potentially resulting in inaccurate diagnosis of dementia, but also can result in indignity and harm to CALDI from the inappropriate use of tests and the interpretation of their results (Samuda, Feuerstein, Kaufman, Lewis & Sternberg, 1998).

In summary, many of the cognitive tests currently utilized in neuropsychological assessments were founded in the 19th century and early 20th century and were originally developed to measure the cognitive and perceptual abilities of school children. Adult cognitive tests have retained this educational influence, although in an attempt to minimise this, nonverbal tasks have also been incorporated in cognitive assessments.

However, the theoretical orientation of these cognitive tests may not be universally applicable across CALDI and misinterpretation of test performance may jeopardize tests' diagnostic accuracy.

1.4 A Historical Review of CALDI Performance on Tests of Cognition

Historically, there has been much debate within cross cultural literature regarding the cause of differences in cognitive test performance by CALD groups. In particular, the debate has focused upon the influence of nature versus nurture on cognitive ability and intelligence. While it is likely that both biological and environmental factors influence performance on tests of cognition, it is beyond the scope of this thesis to outline comprehensively the philosophies of these differing viewpoints. Furthermore, given that the participant groups compared in the current study were from the same ethnic group, the potential relative influence of race, or biological factors, is considered to be low. Hence, the current section includes a review of environmental influences, rather than biological reasons, that have been reported to have impacted on CALDI cognitive performance.

Culture is defined as the belief systems and value orientations that influence customs, norms, practices, and social institutions, including psychological processes (language, care taking practices, media, educational systems) and organizations (media, educational systems; Fiske, Kitayama, Markus, & Nisbett, 1998). Inherent in this definition is the acknowledgement that all individuals are cultural beings and have a cultural, ethnic, and racial heritage. Culture has been described as the embodiment of a worldview through

learned and transmitted beliefs, values, and practices, including religious and spiritual traditions. A culture provides specific models for ways of thinking, acting and feeling. It also encompasses a way of living informed by the historical, economic, ecological, and political forces on a group. These definitions suggest that culture is fluid and dynamic, and that there are both cultural universal phenomena as well as culturally specific or relative constructs (Anastasi, 1988; APA, 1992)

Previously, ignorance of the effects of environmental and cultural factors on cognitive test performance led to the misuse and misapplication of cognitive tests in CALD groups. This section will review the historical context in which such misuse and misapplication of cognitive tests occurred. In addition, a contemporary example of the continued lack of understanding regarding the impact of environmental factors on cognitive test performance will be provided. This is included in order to highlight the continuing lack of consensus regarding these issues within the field of psychology, and to also highlight the potential for inappropriate conclusions regarding cognitive functioning of CALD groups. Following this section, the ecological context hypothesis and the now infamous studies conducted by Vygotsky and Luria, as well as, similar contemporary cross cultural studies are reviewed. It is hoped that by including this historical review of CALDI performance on tests of cognition that this will lead to an increased awareness of the impact of environmental and cultural factors on cognitive test performance. This in turn is hoped to enable an informed discussion about approaches that could improve the accuracy in diagnosis within CALD groups (Berry, 1993).

1.4.1 Misuse and Misapplication of Cognitive Tests in CALD Groups

Psychology has been traditionally defined by and based upon Western, Eurocentric, and biological perspectives and assumptions. In neuropsychology, cognitive disturbances associated with brain pathology of a very limited sample of individuals, that is contemporary Western and often urban middle class and literate individuals have been relatively well analysed. Ardilla (1995) argues that our understanding about the brain's organisation of cognitive abilities, and their disturbances in cases of brain pathology, is therefore not only partially understood but also culturally biased. The traditional premises in psychological practice have not always considered the influence and impact of racial and cultural socialization, and linguistic diversity. They also have not considered that the effects of related biases have, at times, been detrimental to the increasingly complex needs of clients and the public interest (Reed, McLaughlin, & Newman, 2002).

One of the major criticisms that clinicians face in assessing CALDI is that the tests that are used to assess these individuals are biased. In addition, that the validity and reliability of a test used with individuals of a different cultural or linguistic groups who were not included in the standardization group are questionable. Bias in testing refers to the presence of systematic error in the measurement of certain factors, such as cognitive abilities, among certain individuals or groups (Suzuki, Meller, & Ponterotto, 1996). Van de Vijver and Tanzer (2004) noted that tests may be considered biased if they contain only predominant values and attitudes and do not reflect linguistic and cultural experiences of CALD groups (referred to as item bias). Furthermore, mode of test administration and practical issues need to be considered. For instance, tests vary in terms

of the level of education (especially reading skills and knowledge gained during formal schooling) that examinees must have to understand them adequately. For instance, the examinee must be able to read, comprehend, and respond appropriately to the test (Groth-Marnat, 1999). Similarly, speed tests are a good example of an administrative procedure that can serve to penalize test takers that are not proficient in English (referred to as method bias). A central issue relates to the adequacy of norms. Each test has norms that reflect the distribution of scores by a standardization sample. The basis on which individual test scores have meaning relates directly to the similarity between the individual being tested and the sample that the test was normed in (Groth-Marnat, 1999). An example of the potential consequences of not considering issues relating to test bias is presented below.

In the early 1900's, U.S.A. Public Health Service physicians at Ellis Island in New York harbour were responsible for screening arriving immigrants for mental and physical disorders. Grounds for exclusion included contagious diseases and deformities that would render an individual unable to earn a living. Additionally, if a migrant was deemed to be mentally deficient, feeble-minded or what today would be described as a person with a developmental disability, this was also a reason for exclusion under the 1882 immigration law. Pressure to restrict immigration resulted from a widely held belief by the general public and political figures that the feeble-minded were degenerate individuals responsible for social problems, that they endangered the biological fitness of the nation, and that their numbers were being boosted by immigrants from Southern and Eastern Europe (Richardson, 2003).

The Binet-Simon scale provided psychologists with a means to classify the feebleminded and allowed them to claim expertise in the diagnosis of mental retardation. A battery of cognitive tests, including the Binet-Simon scale was administered to a sample of immigrants at Ellis Island. It was reported that 83% of the Jews, 80% of the Hungarians, 79% of the Italians, and 87% of the Russians were feebleminded (Kamin, 1982). There has been some dispute in the literature as to which particular researcher was involved in making this claim and to what extent this affected public policy at the time. However, these results would have had negative implications for these migrant groups given the widely held belief that human intelligence was biologically determined and that mentally retarded people threatened society economically through the cost of institutionalization, and biologically through their genetic impact on the fitness of the population (Gould, 1980; Dorfman, 1982; Tucker, 1999; Richardson, 2003). Recent articles indicate that there were physicians at the time, such as Knox, who thought this practice unsound due to the fact that many immigrants spoke no English and had little or no formal education, and considered it absurd to use educational tests with uneducated persons. Despite this, any thoughts of intelligence deviating from the biological model and being influenced by cultural experience were dismissed on the basis of the popular dogma at that time (Richardson, 2003; Boake, 2002).

One might argue that psychologists' understanding of such issues has since advanced and that both biological and environmental factors are taken into consideration when interpreting performance on tests of cognition. However, given the various schools of thought regarding intelligence, and that a unified theory of intelligence still remains

ellusive, it is important to continue to highlight the contribution of environmental factors and cultural experience to performance on western tests of cognition. For instance, Herrnstein and Murray's (1994) book 'The Bell Curve' did not take into consideration the impact of cultural and environmental factors on test performance. The authors advanced the theory that intelligence was an inherited and a relatively invariant trait of an individual (Koschmann, Ohlsson, & Perkins, 1998). The authors attempted to link level of intelligence as the main factor required for success in life, and stated that intelligence tests were not biased in assessing intelligence in different cultural groups. They argued that groups at the lower end of the bell curve (such as African Americans) would not benefit from intervention programs and therefore such programs are not a sound social investment. Although many psychologists refuted these claims, emphasising that performance on tests of intelligence and cognition is an acquired skill gained through formal education, nonetheless the potential for harm to CALD groups is self evident (Sternberg, 1995).

It is widely agreed that standardized tests do not sample all forms of intelligence and not all areas of cognition (such as creativity, wisdom, practical sense, and social sensitivity). Despite the importance of these abilities we know very little about how they develop, what factors influence that development, how they are related to traditional measures of intelligence (Neisser et al., 1996). Furthermore, researchers have also highlighted that performance on mainstream standardized tests does not necessarily equate to the actual level of functioning of CALD groups. For instance, Asian Americans, particularly those of Chinese and Japanese extraction, have achieved an outstanding record of academic and

professional achievement, as reflected in scholastic achievement and in the disproportionate representation of Asian Americans in many sciences and professions. Neisser et al., (1996) reported that 1980 census data indicated that the proportion of Chinese Americans employed in managerial, professional, or technical occupations was 55% and that of Japanese was 46%. For European Americans, the corresponding figure was 34%. Although it is often assumed that professional achievements (or employment status) reflect correspondingly high performances on tests of intelligence and cognition, this was not the case as the Asian Americans IQ scores were in fact slightly below 100 points. Hence the achievements of these Asian Americans far outstripped what might have been expected on the basis of their test scores. The authors argued that various aspects of the Chinese and Japanese culture contributed to the group's "overachievements", and that these findings serve as sharp reminder of the limitations of IQ-based, and western cognitive test, based prediction of everyday function.

1.4.2 The Ecological Context Hypothesis and the Uzbekistan Studies

Ardila, Rosselli, and Puente (1994) also asserted that current cognitive assessment practice makes certain assumptions regarding accurate neuropsychological assessment. The authors noted that the assumptions of accurate neuropsychological assessment include that an examiner has both appropriate psychometric instruments, with high reliability and validity. That the tests are administered in a standardised manner, and that well trained professionals are able to meaningfully interpret test results. The authors argued that these assumptions provided the basis for the principle that if the testing situation was held constant, then the dependent measure (human brain function) will be

correctly measured. However, the authors emphasised that there is a major limitation with this assumption, where there is the implied belief that brain function as assessed by interpretation of neuropsychological test performance is relatively, impervious to variables such as language, culture, age, and education. The authors proposed that variables beyond test instruments and neuropsychologists' qualifications are critical to understanding brain function, and that of the many potential variables that may play a role in the measurement of human brain function some of the most important are ethno-cultural and educational in nature. Ardila, Rosselli and Puente proposed that in order to accurately assess brain function one must consider the individuals cultural experience, language use, age and education. This approach regarding the measurement of human brain function was termed by the authors as the ecological context hypothesis.

Any science seeks generalisations, and cognitive science is no exception. It is thought that cognitive processes are likely to be universal among all humans (Van de Vijver & Willemsen, 1993; Neisser et al., 1996; Berry, Poortinga, Segall & Dasen, 2002). However, one's experience, or cultural and linguistic background, has been reported to influence the type of cognitive abilities and the degree of the development of these cognitive abilities. Furthermore, it is argued that education and literacy level are associated with particular cognitive styles which cognitive tests were developed to assess (Gauvain, 1993; Berry, Poortinga, Segall & Dasen, 2002). Berry (1993) stated that the distribution of psychological characteristics within and across groups can best be understood with the help of an ecological, cultural, and behavioural framework. He argues that when ecological, biological, cultural and acculturation factors are identified

and taken into consideration, it should be possible to account for how and why people differ from one another, and also why they are the same.

Interest in observing differences and similarities in cognitive abilities among persons from different countries and cultures is as longstanding as cognitive assessment. Nell (2000) outlined the historical theoretical foundations of the perspective that thinking and mental processes are generally shaped by social experience and socio-cultural forms. In the early 1900's, Vygotsky purported that all intellectual abilities are social in origin. He argued that language and thought first appear in early interactions with parents, and continue to develop through contact with teachers and others. He also suggested that the development and organization of basic psychological processes such as abstraction, inference, and memory depended on the type of symbols, for instance writing systems, used by individuals in their environment (Manly, Byrd, Touradji, Sanchez, & Stern, 2004). Following a series of large scale studies by Scribner and Cole (1981) of the Vai people in Liberia, the experimenters concluded that although literacy is not necessary for the development of logic, abstraction, memory, and communication skills, the nature of writing systems and the way in which they are used, affect the organization and expression of these cognitive abilities. These studies will be reviewed in the forthcoming literacy section.

Scribner and Cole's experiments were based on the sociocultural psychological theories developed by Vygotsky and his colleagues. The now famous studies by Luria, a former student of Vygotsky, of the impact of literacy on Uzbekistan "peasants" are often cited in

current studies of the cognitive consequences of literacy (Berry, Poortinga, Segall & Dasen, 2002). Vygotsky worked with Luria who later conducted cross cultural experiments in Uzbekistan in the early 1930s. Luria investigated cognitive processes such as abstraction and generalisation with participants of differing literacy levels. Participants were requested to categorise a set of objects, for example, a hammer, a saw, a log, and a hatchet, and were asked which three items were similar. An illiterate central Asian participant insisted that all four fit together, even when the interviewer suggested that the concept of 'tool' could be used for the hammer, saw, and hatchet, but not for the log. The participant in this instance combined the features of the four items that were relevant in terms of his culture and arrived at a functional or situational concept (things you need to build a hut). Later, following a short period of schooling, participants categorised the objects according to their materials (Levav, Mirsky, French, & Bartko, 1998).

Luria reportedly noted that the less educated and less literate participants' mode of problem solving was situationally or context bound. Their problem solving tended to be related to their day to day activities, and as such they solved cognitive problems in a context bound manner. It was also noted, that their problem solving approach was more influenced by the perceptual and functional attributes of a stimulus, and that there was a consistent rejection of a more theoretical abstract mode of problem solving in favour of the more practical one (Manly, Byrd, Touradji, Sanchez & Stern, 2004). In addition, where participants were unable to draw from personal experience they were unable to construct logical links between propositions in a deductive argument (Nell, 2000). Luria reportedly concluded that psychological processes are related to changes in the

environment, and that forms of cognition used by members of an industrialised society are different from those used in early agricultural societies. He further argued that changes in social conditions may result in changes in the forms taken by cognitive processes (Levav, Mirsky, French, & Bartko, 1998). Luria concluded that “the process of abstraction and generalization are not invariant at all stages of socioeconomic and cultural development. Rather such processes are themselves products of the cultural environment” (Luria 1979, p. 74; cited in Nell 2000, p. 42). Luria also stated that any cognitive process is historically conditioned and Nell argues that this cultural difference in test performance should not be regarded in a pseudo-evolutionary sense. For instance, when researchers have contact with a culture that differs from their own, they should not attribute advancement to their own culture and primitivism to the other.

For a second experiment in 1931-32 Luria and Vygotsky planned an expedition to Central Asia to perform psychological experiments designed to evaluate the effects of culture and social relationships on functions such as memory, perception, and attention. Because Vygotsky was ill, Luria led the expedition. He was able to compare differences in performance among residents of a large city, a remote village, and a state farm. Luria noted that a group of nomadic people in Uzbekistan did not have perceptual illusions and questioned whether Gestalt principles were due to culturally transmitted modes of perception rather than the consequence of brain structure (Levav, Mirsky, French, & Bartko, 1998; Nell, 2000).

1.4.3 Cognitive Tests Measure Learned Abilities

Ardila (1995) stated that cognitive abilities usually measured in neuropsychological tests represent, at least in the contents, learned abilities, and it is evident that scores will correlate with the subject's learning opportunities and contextual experiences. Standardised tests of cognition presume that examinees have a common cultural acquisition. In Western societies this cultural knowledge is acquired via education and socialisation processes. Furthermore, culture dictates what is and what is not situationally relevant. In other words, in Western societies the culture of standardised tests is transmitted to the child by parents and other figures in early childhood, and then elaborated during the years of formal schooling through the use of the dominant language. Standardised tests, therefore, become measures of how well one has learned the information that has been transmitted in the dominant culture (Samuda et al., 1998). What is relevant and worth learning for an Aborigine living in remote areas of Australia, does not necessarily coincide with what is relevant and worth learning for an inhabitant of a major metropolis such as Sydney (Berry and Dasen, 1974). A culture provides specific models for ways of thinking acting and feeling, and cultural variations in cognitive test scores are evident (Anastasi, 1988). Hence all tests are culturally loaded, that is they have a degree of cultural specificity (Suzuki, Ponterotto & Meller, 2001).

Cross cultural psychology has grappled with the question whether tests with a theoretical orientation from one particular culture can be applied to a different culture. This is an issue of contention because content assessed on cognitive tests can differ in importance across cultures or languages. Hence, the tests degree of cultural specificity can also vary

across CALD groups (Suzuki, Ponterotto & Meller, 2001). For instance, different approaches to the cognitive grouping of items and different problem solving approaches may be incongruous with Western paradigms of test development and scoring. In many of Luria's studies, the unschooled participants had great difficulty in solving the problems given to them. Often they appeared to be 'thrown off' by an apparent discrepancy between the terms of the problem and what they knew to be true. In another frequently cited example, Cole, Gay, Glick and Sharp (1971) asked adult members of the Kpelle African tribe to sort names of various objects, such as fruits, vegetables, or vehicles of conveyance. They found that the adults sorted functionally rather than taxonomically. For example, they might sort apple with eat, or car with gas, rather than sorting various kinds of apples together under the word apple, and then fruits, and perhaps then foods. The Kpelle way of doing this task would be considered in Western societies as immature and lacking in abstract thinking as it is how young children would complete the task. Most theorists of cognitive development, for instance Piaget, would view functional sorting as inferior. On the vocabulary section of the Wechsler intelligence test, a functional definition of an automobile as using gas would receive less credit than a taxonomic definition of an automobile as a vehicle of conveyance. Interestingly, when the researchers questioned a member of the tribe about how an unintelligent person would sort the objects, the man proceeded to sort the terms taxonomically. In other words, he considered unwise what a Western psychologist would consider clever. It was theorized that this was because in everyday life, for the most part, our thinking is functional. For instance, we think about eating an apple, we do not think about the apple as a fruit, which is a food, which is an organic substance (Greenfield, 1997).

Although culture and education are factors that significantly affect cognitive performance, it is often difficult to distinguish between the effects of these two factors since the educational level influences the sociocultural status of an individual. Therefore, although it is common to attribute the differences between the performance in neuropsychological tests to both the level of education and the culture, frequently the effects of the two variables are confounded. In an attempt to investigate the differing effects of these variables on cognition Ostrosky-Solís, Ramirez, Lozano, Picasso, and Velez (2004) examined the influence of education and of culture on the neuropsychological profile of a non-indigenous group and an indigenous group. Participants were matched by age and educational level. The NEUROPSI, a brief neuropsychological test battery developed and standardized in Mexico (Ostrosky-Solís, Ardila & Rosselli, 1999) was individually administered. Results demonstrated differential effects for both variables. Indigenous participants obtained higher scores in visuospatial tasks, and their level of education had significant effects on working and verbal memory. No significant differences were found in other cognitive processes such as orientation, comprehension, and some executive functions. The investigators concluded that their data supported the view that culture dictates what it is important for survival and that education could be considered as a type of subculture that facilitates the development of certain skills instead of others. The authors stressed that culture and education both affect cognitive skills, so that accurate assessment of cognitive dysfunction, and hence, accurate diagnosis, is dependent upon understanding the influence of both education and cultural skills (Ostrosky-Solís, Ramirez & Ardila, 2004).

In summary, ignorance of the effects of environmental and cultural factors on cognitive test performance has previously led to the misuse and misapplication of cognitive tests in CALD groups. Although cognitive processes are likely to be universal among all humans, one's experience, or cultural and linguistic background, influences the type of cognitive abilities and the degree of the development of these cognitive abilities. Furthermore, education and literacy level are associated with particular cognitive styles and certain learned abilities which cognitive tests were developed to assess. Standardised tests of cognition presume that examinees have a common cultural acquisition, which cross cultural researchers caution is not the case for CALDI. Researchers have emphasised that culture dictates what it is important for survival and that education could be considered as a type of subculture that facilitates the development of certain skills instead of others.

1.5 Cognitive Test Performance by CALDI and Risk of Diagnostic Inaccuracy

Artiola i Fortuny (2004) purports that, due to western examiners' ethnocentrism leading to an exaggerated and therefore inaccurate view regarding the place of one's own cultures in the world, there is a degree of ignorance and complacency regarding cross cultural assessments manifesting in the decision to assess CALDI without appropriate cross-cultural sensitivity and respect. The author stated that, generally speaking, little consideration is given by examiners to the theoretical orientation of cognitive tests and whether the cognitive skills, as assessed by current tests, reflect the skills that the examinee's culture would dictate as being important for development. In addition, while test norms were developed for western individuals with high level of education, these same norms tend to be applied inappropriately to CALDI and in turn diagnostic

inferences are then made based on norms not originally intended for CALDI. However, an increasing number of researchers have suggested that the unavailability of demographically appropriate norms could have detrimental implications in terms of diagnostic accuracy (Friedman, Schinka, Mortimer, & Graves, 2002). The current section reviews studies which reported that cognitively normal CALDI are more likely to be misdiagnosed as impaired, particularly when western mainstream norms were used to interpret CALDI performance on testing. The literature refers to mainstream participants as either 'White' or 'Caucasian'. As there is a lack of consensus regarding these terms and what type of participants they actually refer to, both terms have been retained and reported as used by the original researchers.

Researchers have suggested that cognitively normal African Americans are more likely to be misdiagnosed as impaired compared to Caucasians due to lower scores on standard neuropsychological tests (Manly, Jacobs, Touradji, Small & Stern, 2002; Manly & Miller, et al., 1998). Roberts and Hamsher (1984) found that neurologically normal Whites obtained significantly higher scores on a measure of visual naming ability than did normal African Americans, even after correcting for educational level. Using the standard cut off, 22% of these normal African Americans would have been classified as impaired on the basis of their performance.

Manly, and Jacobs, et al. (1998) investigated psychometric differences of a randomly selected community sample of English-speaking African American and White elders aged over 65 years. A neurologist assessed participants (317 African American and 147

White), independent of neuropsychological test scores, and they were diagnosed as nondemented. Psychometric measures included the Similarities subtest of the Wechsler Adult Intelligence Scale-Revised (WAIS-R) and the Benton Visual Retention Test. African American elders obtained significantly lower scores on measures of verbal and nonverbal learning and memory, abstract reasoning, language, and visuospatial skills than Whites. The authors reported that 21% of the African American community elders demonstrated neuropsychological test scores sufficient to meet criteria for cognitive impairment sufficient for a diagnosis of dementia. The authors highlighted that the implications of such research findings are multifaceted, including the possible psychological consequences for an individual, and their family, of being labeled demented or cognitively impaired. Patton, Duff, Schoenberg, Mold, Scott and Adams (2003) reported similar findings with their cognitively normal older African American sample. They reported that their African American sample scored significantly lower on the majority of cognitive tests administered as compared to a Caucasian sample matched on age, education, and gender. These investigators highlighted the need for normative data for minority groups in order to assist clinicians in minimizing diagnostic errors.

Research findings have also suggested that Spanish-speaking individuals are more likely to be misdiagnosed as compared to Caucasians due to lower scores on standard neuropsychological tests. For instance, the Luria-Nebraska Battery was used to detect brain damage in a Spanish-speaking population in a neurological service of a hospital institution in Mexico City. Results obtained were at chance level, with only 45% accuracy in discriminating between normal and brain damaged participants (Galindo &

Ibarra, 1984; cited in Ardila, 1995). Similarly, Arguelles and Loewenstein et al. (2001) investigated the performance of Spanish-speaking and English-speaking normal elderly controls (N = 91) and patients with AD (N = 119) on the Digit Span subtest of the WAIS-R. Their results indicated that English-speaking groups of AD patients and normal controls had significantly higher scores on all aspects of the standard Digit Span tasks relative to their Spanish-speaking counterparts (forward, backward, and total scores). The authors concluded that their findings had important implications for the development of more culture and language appropriate cognitive test batteries for AD patients and the normal elderly. However, studies conducted in the U.S.A. emphasise the need for not only language competency in testing CALDI but more importantly the need to re-norm these tests.

Demsky, Mittenberg, Quintar, Katell and Golden (1998) acknowledged that many clinicians administer cognitive tests normed on English-speaking American groups, which have been translated into Spanish, and then interpret the test results using the standard American norms due to lack of Spanish-American norms. Clinicians in this situation argue that this procedure is a reasonable approximation of the Spanish-American functioning, and when cautiously interpreted, can be useful in diagnosis. The authors investigated the impact of this practice by using the Wechsler Memory Scale-Revised (WMS-R) Spanish translation on a group of 50 normal Hispanic Americans aged 25 to 34 years of age. The researchers reported that their results showed that the use of English-language standard norms resulted in Spanish-speaking normal individuals scoring an average of 1 standard deviation below “average”. The authors concluded by

arguing against the clinical practice of using translations of English tests without re-norming and standardising in the appropriate population.

Ostrosky-Solis, Lopez-Arango, and Ardila (2000) also argued against the practice of applying norms from one CALD group to another. The experimenters administered the MMSE to 430 normal Mexican participants divided into three age ranges and four educational ranges. They found that normal illiterate participants obtained scores that would correspond to severe cognitive impairment ($M = 17.7$), and low education (1 to 4 years) participants would be classified as having moderate cognitive impairment ($M = 20.6$). They questioned the diagnostic utility among individuals with low levels of education, particularly when applying mainstream norms. The authors also speculated whether this pattern of performance applied to other, more challenging tests of cognition.

Espino, Lichtenstein, Palmer and Hazuda (2001) examined differences between MMSE performance in a population based sample of community dwelling 65 years and older Mexican Americans and European Americans. The investigators found that Mexican Americans were 2.2 times more likely than European Americans to have MMSE scores less than 24. Bertolucci, Brucki, Campacci and Juliano (1994) reported that according to their findings from a sample of 530 individuals with a diverse educational background, that the cut-off point for illiterates should be set at 13 points out of 30 on the MMSE. However, this score would be considered as significantly abnormal for any schooled individual (Ostrosky-Solis, Ardila, Rosselli, Lopez-Arango, & Uriel-Mendoza, 1998).

Given these findings some researchers have argued for adjusting test cut off scores when assessing individuals with low educational levels (Shadlen et al., 2001).

In summary, the unavailability of demographically appropriate norms for CALDI could have detrimental implications in terms of diagnostic accuracy, as cognitively normal individuals are categorised as impaired according to western mainstream test norms. Although researchers have recommended adjusting test cut off scores in order to try and approximate for the influence of cultural and demographic factors on test performance, evidence based guidelines are lacking in order to guide this practice.

1.6 The Question of Culture Free Tests

Over the years, stimulated in part by the migration and resultant diversity of CALD groups in Western countries, psychologists have tried to find culture free tests with diagnostic utility. In 1940 Cattell, an American psychologist, attempted to create culture free tests. Cattell proposed that if language was removed from tests, all other nonverbal reasoning functions would be similar across different ethnic and cultural groups (Levav, Mirsky, French, & Bartko, 1998). Lewis (1998; cited in Samuda et al., 1998) reported that the shift to use supposed 'culture free' and 'culture fair' tests was an attempt to counteract, or at least balance, the culturally loaded information and language items found in standardised tests. Reducing the number of language items and timed aspects of tests has been considered a means of reducing culturally loaded test items. Although the author stressed that no test can be considered culture free, some have been proposed to be culture reduced instruments. The most widely used instruments of this type are Cattell's

(1973; cited in Samuda et al., 1998) Culture Fair Intelligence Test, Raven's (1938; cited in Samuda et al., 1998) Progressive Matrices, the Leiter (1948; cited in Samuda et al., 1998) International Performance Scale, and the Goodenough Harris Drawing Test (Harris, 1963; cited in Samuda et al., 1998). However, Cattell's assumption that nonverbal reasoning functions would be similar across CALDI has not been supported by data from a large number of studies, suggesting that culture free tests may be an unattainable idea (Ardila, 1995; Levav, Mirsky, French, & Bartko, 1998). The current section reviews studies which reported significant performance differences by CALD groups on nonverbal tests of cognition proposed to be free from cultural influence. Following this review, factors that have been purported to make nonverbal tests of cognition culturally loaded are also outlined and discussed.

For instance, the inadequacy of nonverbal test as culturally fair tests has been demonstrated in a study examining performance on Raven's Standard Progressive Matrices which has been considered as a culturally fair test (Shuttleworth-Edwards & Kemp et al., 2004). Owen (1992) investigated the suitability of Raven's Standard Progressive Matrices for various groups in South Africa. He administered the Progressive Matrices to 1,056 White, 778 non-White, 1,063 Indian, and 1,093 Black secondary school students in South Africa and found large mean test score differences between these groups. The author concluded that the test is unsuitable for use as a common test with common norms for Black and White secondary school students.

A further example of the inadequacy of nonverbal tests as culturally fair measures was reported by a study that investigated the relationship between childhood language spoken at home and performance on neuropsychological tests (Sherwood, 2005). One hundred and forty Navajo adult volunteers participated in a broad assessment of neuropsychological functioning, including assessment of language and nonverbal skills. Sherwood (2005) reported that although Navajo participants obtained scores frequently lower than Anglo normative scores, this pattern was significantly affected by gender. Significant strengths existed among Navajo men on visual-spatial construction, memory, and reasoning tests in comparison to Navajo women, who in turn performed significantly better than the men on speeded, visual-attention tests. Childhood home language (i.e., Dine/Navajo or English) was found to significantly affect scores on two of the tests. In particular, subjects who grew up in a home where English was the predominant language did better on an expressive vocabulary test and a visual-spatial abstract reasoning test. The relationship between English in the home and a subject's ability to define English words was as anticipated. However, the relationship between home language and abstract reasoning on a visual-spatial test was unexpected, as this latter test has traditionally been considered to be a non-verbal, culture-fair assessment tool.

Similar findings have been reported by researchers assessing Spanish-speaking elders. Jacobs et al. (1997) compared the performance of randomly selected, community-based samples of 118 English and 118 Spanish speaking elders (all aged between 65 to 90 years) on a brief neuropsychological test battery to determine which measures yielded comparable performance in English and Spanish speakers and which did not. Results

indicated that Spanish speaking elders scored comparably on many language-based tasks, but Spanish speakers scored significantly lower on almost all of the nonverbal measures. Significant group differences were observed on multiple choice matching and recognition memory for stimuli from the Benton Visual Retention Test, as well as on Identities and Oddities from the Mattis Dementia Rating Scale, category fluency, and Complex Ideational Material from the Boston Diagnostic Aphasia Examination (BDAE). The authors urged caution in using nonverbal as well as verbal measures to assess CALDI. Their recommendation is in keeping with other research findings which have also indicated the need to use caution when using verbal as well as non-verbal test measures in ethnically diverse cohorts (Lopez & Taussig, 1991; Jacobs et al., 1997; Loewenstein, Arguelles, & Linn-Fuentes, 1994; Loewenstein, Arguelles, Barker, & Duara, 1993; Taussig, Henderson, & Mack, 1992; Taussig, Mack & Henderson, 1996).

1.6.1 Cultural Factors that Influence Performance on Nonverbal Tests of Cognition

Although nonverbal tests are considered to be culture-reduced these tests still assume that the examinee has been socialised and educated in the culture in which the test originated, that is Western society. This is an important assumption as researchers have argued that the abilities to classify, serialise, and problem-solve are functions that are developed by being socialised and educated in the Western culture (Ardila, 1995). La Rue (1992) noted that performance on visuospatial tasks is influenced by many individual difference parameters. For example, judgments of line orientation, embedded figures, matrices and facial recognition were all reported to be influenced by education. Ardila et al. (1989) administered a basic neuropsychological battery of visuospatial and memory abilities to

200 right-handed Colombian adults. In visuospatial tasks all differences between the literate and illiterate groups were significant and favoured the literate participants. La Rue highlighted that a very important characteristic of most of these tests is the unfamiliarity of procedures, and postulated that it may be this aspect of testing rather than visual and perceptual demands per se that affects test performance.

Rosselli and Ardila (2003) reviewed studies investigating the impact of culture and education on nonverbal neuropsychological measurements. They reported that several studies have demonstrated a strong association between educational level and performance on common nonverbal neuropsychological tests. They stated that when neuropsychological test performance in different cultural groups was compared, significant differences were found. The authors concluded that performance on nonverbal tests such as copying figures, drawing maps or listening to tones can be significantly influenced by the individual's culture. There is now a vast literature on cross cultural psychology, beyond the scope of this review, which attests to the complexity of issues raised (Berry, Poortinga, & Pandey, 1997).

In summary, the figural and pictorial nature of nonverbal instruments may not be culture-fair, as claimed, because they still require abstract thinking processes and analytical cognitive styles that are not developed in some cultures. Given that marked differences in the perception of pictures by individuals of different cultures have been reported, researchers argue the use of nonverbal tests may also be culturally biased as pictorial representations may be unsuitable with individuals unaccustomed to representative

drawings (Ardila, 1995). Furthermore, these tests have shown only moderate concurrent validity when correlated with other standardised instruments such as the Wechsler scales (Anastasi, 1988; Artiola i Fortuny, 2004). In terms of inferences that can be drawn regarding diagnostic issues, these are also limited due to the nature of the tests. However, despite these issues using both types of tests may facilitate a more equitable test administration and supplement the data obtained from a CALD client.

1.7 Cultural Differences in Interview Participation and Test Taking Behaviours

Artiola i Fortuny (2004) emphasised that it cannot be assumed that clients, and particularly illiterate individuals who have had little or no contact with Western-style medicine or psychology, would automatically be frank and disclose personal information to the clinician as attitudes toward privacy may be different. For instance, the clinician may be viewed as a powerful authority figure that needs to be provided with the answers they want to hear. Conversely, the clinician may be viewed as a stranger who has the audacity to ask questions regarding matters that are not of their concern. Ardila (2005) noted that in many societies it can be inappropriate to question a stranger in an impersonal manner and that without talking and interchanging ideas before beginning, testing can be aversive and disconcerting for some CALDI. Therefore, information gathered under these circumstances may be too vague or unreliable to be useful. The focus of this section is to review cultural differences in clinical interview participation, degree of familiarity with testing procedures and test items, differing approaches to solving tasks, perceived relevance of cognitive tasks, and how these factors can impact upon CALDI performance on western tests of cognition.

Moore (1986) has indicated that CALD clients approach standardised tests differently than clients from mainstream western culture. The author described the presence of a spontaneous elaboration style in many mainstream individuals that is characterised by an examinee's willingness to elaborate on words and meanings by relating the concepts to personal experiences and verbalising these relationships. This spontaneity has been considered to be an indicator of how deeply involved the client is in the examination process and how task-focused, motivated, and anxious the client is during testing. However, CALD clients may often not answer the examiner's questions and, if they do, they tend to provide succinct answers and generally do not elaborate when prompted. Moore concluded that the examiner must be in tune with the response style exhibited by the testee and consider non-responsiveness as a possible cultural difference rather than a deficit.

It has also been reported that clinician related variables can also affect test performance. For instance, the characteristics of the interviewer can alter standardized test performance. Parsons and Stewart (1966) found that brain-damaged patients performed significantly better when the interviewer was perceived as interested, warm, and supportive as opposed to factual and disinterested. Clients unfamiliar with psychological services and who hold worldviews that value relationship over task completion may experience disrespect if procedures are not fully explained. If such clients do not feel that the therapist is valuing the relationship between the therapist and client enough, they may not participate with assessment or may not be motivated to complete tasks to the best of their ability during assessment. Thus if emotional tone, technique, and social content of

the interview are not in tune with the response style of the client this could result in an inaccurate measurement of abilities, leading to possible misdiagnosis. Sensitivity to cultural issues, and allowing the patient to feel at ease, may reduce these effects with a diverse population (Moore, 1986).

Similarly, information about our daily lives that we believe important may not be considered as relevant by the unschooled client. Moreover, information that we assume to be basic such as date of birth, may be unimportant to the individual being examined. Artioli i Fortuny (2004) stated that for many non-Westernised, unschooled populations, autobiographic details that Western individuals consider basic and all-important are of no relevance whatsoever. For instance, a number of older GA do not know their actual birth date, as in some rural areas it was difficult to record this on the day of their birth. Greeks also have a cultural difference in how they measure one's age. A 10 year old would be labeled as being 11 years of age, because they argue that following the 10th birthday a person has closed those number of years and has entered their next year of life. In addition, according to Greek Orthodox tradition, every day of the year is dedicated to a Christian saint or martyr; as such Greeks have a name day as well as a birthday. A person's name day is the feast day of the saint after which they were named. A name day is seen as a more important occasion as it is a religious holy day. Hence, name days, not birthdays, are celebrated in Greece and are most likely to be more easily remembered.

Culture specific characteristics such as the degree of familiarity with testing procedures, the salience of test items, and behavioural expectations can vary from one culture to

another and have also been reported to influence cognitive performance (Ardila, 1995; Van De Vijver, Helms-Lorenz & Feltzer, 1999; Suzuki, Meller & Ponterotto, 1996; Berry, 1993). Bracken and Barona (1991) reported that there is evidence to suggest that CALDI interpret test items differently, and bring to the test situation a different set of expectations and knowledge, and thus do not generally score as high as members of the mainstream culture on standardized tests. For instance, on the Boston Naming Test, items like "pretzel" may be common in many places but are frequently unfamiliar to Cuban American and other Spanish-speaking older clients (Arguelles, & Loewenstein, 1997).

In terms of differing behavioural expectations Berry (1993) noted that in some groups, holistic rather than analytic problem solving is culturally valued, and that deliberation rather than haste is the proper course of action. Moreover, collective discussion, rather than individual reflection may be the preferred mode. Greenfield (1997) conducted a number of studies in a variety of cultures and reported that the types of test-taking expertise assumed to be universal in the U.S.A. and other Western post industrial countries are not universal in all cultures. For instance, she found that children in Mayan cultures were puzzled when they were not allowed to collaborate with parents or others on test questions. In Western societies this would be considered cheating, however, in a collectivist culture, someone who has not developed this kind of collaborative expertise and, more importantly, someone who did not use it, would be considered as lacking important adaptive skills.

Western test-taking skills have been described as having an awareness of nervous energy and motivation to perform well, being able to concentrate intently to the task at hand, without chatting with the examiner, and to be able to simultaneously work as fast, as well as accurately as possible. According to Nell (2000) it is difficult to define whether test-taking skills are taught or absorbed intuitively from experiences. However, Nell highlights that test-wiseness is most powerfully acquired through the formal education system, and that high school education (10 or 12 years of formal schooling) generally leads to a variety of test taking skills. Ardila (1995) argues that illiterate individuals are not used to being tested and that they have not learnt how to behave in a testing situation. For many illiterate individuals and for many persons with low levels of education testing represents a nonsensical and irrelevant situation. As such they may question the relevance of tasks presented, for instance, they may question the relevance of memorising a series of meaningless digits.

Ardila and Moreno (2001) conducted a study which demonstrated how the perceived relevance of tasks can impact upon CALDI test performance. The investigators individually administered a brief neuropsychological test battery assessing visuoconstructive and visuoperceptual abilities, memory, ideomotor praxis, verbal fluency, spatial abilities, and concept formation to a sample of Aruaco Indians. The authors reported that the participants performed in a manner similar to mainstream western individuals on some tests (e.g., Recognition of Overlapped Figures and Ideomotor Praxis Ability tests), whereas performance on other tests differed considerably. For instance, it was impossible to perform within the time limit on Block

Design. Although the authors stated that their participants' performance was influenced by educational level, they also noted that cultural relevance was also important as some tests appeared meaningful to their participants, however, others were meaningless and impossible for them to understand.

In a further illustration of how culture specific characteristics can impact neuropsychological test performance, Nell (2000) reported the following case example. He assessed a 37 year old inpatient African woman that had been a dress maker, and had 3 years of formal education. She was seen with the assistance of a Black psychology graduate who acted as an interpreter, and she presented as a bright and lively person. She was initially unable to draw a Greek cross, she could not draw a circle and square touching one another, her planning on the Complex Figure of Rey was noted to be chaotic, and on the Raven's Colored Matrices her answers were consistently wrong. The client's task was to say which of six design alternatives was the best match for a gap of the same size and shape in the pattern printed above. But even on the easiest items her responses were incorrect. Given her performances on neuropsychological testing a hypothesis regarding focal right parietal lobe lesion was formulated. However, much to the surprise of the assessor, at the ward round that afternoon her performance was faultless. Nell noted that during a subsequent session her drawings of geometrical designs had improved, as had her planning on the Complex Figure of Rey after several rehearsals. In regards to her poor performance on the Raven's Colored Matrices, when questioned how she chose the best alternative "she readily explained that she chose her response not because it matched the pattern (that seemed to her to be too easy) but because it made the

most colorful and aesthetically pleasing patch on what she took to be a sheet of fabric with a piece torn out of it.” (Nell, 2000, p.17). Her responses were situationally bound and reflected her personal experience as a dress maker, however, with practice her performance on some testing improved accordingly.

In summary, cross cultural researchers have reported that cultural differences in clinical interview participation, different attitudes regarding privacy, and culture specific characteristics such as the degree of familiarity with testing procedures, the salience of test items, and test taking behaviours can vary from one culture to another and can also influence cognitive test performance. In particular, for many illiterate individuals and for many persons with low levels of education, testing represents an irrelevant situation and the abstract nature of tasks may render the assessment meaningless and impossible for them to understand. This poor performance may be interpreted as reflecting brain pathology rather than cultural differences.

1.8 Language Issues in Cross Cultural Assessments

Verbal communication is central to neuropsychological evaluation as language is a tool of assessment. Cognitive assessment in particular poses several unique challenges when linguistic competence is an issue (Artiola & Mullaney, 1998). The issue of language in the assessment is very important as individuals bring cultural, linguistic, and dialectal differences as part of their communication styles. Language usage also differs according to the individuals’ subcultural background and tends to correlate with their educational attainment. For instance, test instructions, and language generally used in testing, may

sometimes be given in a form of language which may be difficult to understand for those with limited education, as formal language may be quite different to the day to day language most people would use or understand (Ardila, 1995). In the following sections aspects of linguistic competence such as consideration of dialect differences, language proficiency and language dominance, and impact of level of first language acquisition on second language acquisition will be discussed. In addition, assessment issues relating to translated tests, interpreter usage and cultural linguistic differences will also be outlined and discussed.

Language differences do not only exist between different cultural groups, but also within. For instance, there are numerous dialects in Chinese that vary so much that speakers from different regions may not be able to communicate with each other. A speaker of Mandarin, for example, may not be able to communicate with a speaker of Cantonese. Dialects may differ between regions and socioeconomic status levels within the same language. An individual from Mexico, and an individual from Puerto Rico both speak Spanish but have different vocabulary for some words. For example, the Mexican word for swimming pool is *alberca*, while speakers from Puerto Rico will say *piscina* (Suzuki, Meller & Ponterotto, 1996). Similarly, an individual from Thessaloniki, and an individual from Athens have different vocabulary for some words. The Thessaloniki word for meat on a skewer is *σουβλάκι* (*souvlaki*), whereas the word in Athens for meat on a skewer is *καλαμάκι* (*kalamaki*). Interestingly enough the word 'kalamaki' in Greece is commonly used to refer to a straw. However, GA would use *souvlaki* to refer to meat wrapped in pita bread as this is the term commonly used in Australia.

In addition to dialect differences across regions of Greece, the current Greek language is an amalgamation of the ‘official’ language of Greece used by officials and scholars and of the ‘popular’ standard spoken language. Although Modern Greek has undergone major changes in terms of further simplifications of phonological, morphological, syntactic, and lexical features it still reflects these differences between the official and popular Greek language origins (Matsukas, 1997). For instance the word ‘white’ is λευκό(ς) (lefko) in official Greek and άσπρο(ς)(aspro) in popular Greek. People usually ask for άσπρο κρασί (white wine) in popular Greek, and usually get served a bottle labelled λευκός οίνος (white wine) in official Greek. Λευκός Οίκος (official Greek) refers to the White House in Washington DC whereas άσπρο σπίτι (popular Greek) refers to any white house (Matsukas, 1997).

In order to assess CALD clients, clinicians must consider their clients’ proficiency skills and language dominance. Language proficiency refers to the level of skill or the degree to which the individual exhibits control over language use. Apart from asking an adult client to self rate their proficiency in different contexts another way of assessing language proficiency and dominance is to have the client narrate a story from a set of pictures or a book without words. This provides the clinician with an indication of the clients’ capacity for self-expression and level of vocabulary. Language proficiency is measured on a continuum from non-speaker of a language to fluent speaker. Once proficiency levels have been ascertained, language dominance may be determined. An individual may be a very limited speaker of English and a functional speaker of Greek. Therefore, Greek is the dominant language. The dominant language is generally one that is more developed,

it is preferred or it intrudes on the phonological, syntactic, lexical or semantic system of the other (for example, when Spanish syntax is used in English utterances, as in the case of saying “the car blue” for the blue car) (Suzuki, Meller & Ponterotto, 1996).

Code switching is another important aspect of language dominance and proficiency. Code switching is a systematic and rule-governed process whereby a speaker switches from one language to the other at will and in accordance with appropriate situations and contexts (Ortiz, 1984). An individual may begin a sentence in one language and switch to the other within the same sentence, and the grammatical structures remain intact. This is very typical of second language learners and regarded as normal behaviour. As bilinguals learn the usage norms of two languages within the community, they use them to facilitate the total act of communication (Dulay, Burt & Krashen, 1982).

Research has shown that first language acquisition takes a minimum of twelve years (Collier, 1989). Second language acquisition research has found that the process of first language acquisition has a significant influence on the development of second language proficiency. One important finding is that the lack of continuing first language cognitive development during second language acquisition may lead to lowered proficiency levels in the second language (Cummins, 1984). According to Cummins (1984) an individual must have a well-developed linguistic base in his or her first language before being able to successfully acquire a second language. It has been estimated that it takes children two to three years to acquire oral language proficiency or social language, and between five and seven years to acquire language skills needed for academic tasks. Therefore, oral

language proficiency may be rather deceiving, as an individual may appear very orally proficient in conversations and social situations but may not have developed skills in academic areas. Indeed bilingual individuals often may know some facts or vocabulary items in one language and not in the other (Suzuki, Meller & Ponterotto, 1996).

1.8.1 Translated Tests, Interpreters and Linguistic Differences in CALD Groups

Language differences have led many clinicians to use instruments that have been translated into, or adapted for, a language other than English. Bracken and Barona (1991) mention that the practice of translating tests from a source language into a second target language has a number of inherent difficulties and has not generally provided an acceptable solution to the pervasive problem of inappropriate assessment for many reasons. The underlying psychological constructs assessed by translated tests are sometimes not universal across cultures (Berry, Poortinga, Segall & Dasen, 2002; Suzuki et al., 1996; Ponterotto, Casas, Suzuki & Alexander, 1995). In addition, many concepts in one language do not have literal equivalents in another and test instructions are frequently too difficult, stilted or foreign to allow for easy translation. For example, ‘No ifs ands or buts’ is a common phrase, but a linguistically irregular idiom that is used in the MMSE. The phrase was chosen as the assessors required a series of short words of low probability of occurring together in a sentence (Folstein, 1998). The selection of a parallel expression in another language tends to be problematic (Werner, Heinik, Lin & Bleich, 1999). A literal translation in Spanish has been considered to make the item easier than intended (Gasquoin, 2001). However, a literal equivalent to this English saying simply does not exist in Greek and other languages. This dilemma can produce

ambiguous instructions and test responses that reduce the test's reliability and validity when translated. Content assessed on cognitive tests can also differ in importance across cultures or languages (Fouad & Bracken, 1987). Jensen (1975) pointed out that if the first cognitive tests had been devised in a hunting culture, general cognitive assessment may have involved visual acuity and running speed, rather than vocabulary and symbol manipulation.

Practitioner produced translations are rarely back-and-forth translated to provide equivalent meanings across languages (Loewenstein, Arguelles, Arguelles, & Linn-Fuentes, 1994; Berry, Poortinga, Segall & Dasen, 2002; Anastasi, 1998). This procedure is carried out to maximize the accuracy of the translation and to reduce any cultural bias present in test items (Aiken, 1987). In addition, translations usually do not take into account national and regional within-group differences. For instance, and as noted earlier, not all Spanish speakers use the same idioms and dialects, and word meanings may be different among Mexican, Cuban, and Puerto Rican clients. Furthermore, translations often produce words with different levels of difficulty and, thus, change the complexity of the original task. This change can affect the meaning of words and result in unanticipated idiosyncratic responses (Dana, 1993). It has also been noted that there has been a general failure to develop workable translation procedures or standards against which to systematically judge the equivalence of translations and constructs across languages or cultures (Suzuki, Meller & Ponterotto, 1996).

Given that bicultural and fluent bilingual neuropsychologists are in short supply, most English speaking neuropsychologists use interpreters to conduct their evaluations of CALD clients, and often without research validated translated English tests. The use of a family member or not properly qualified individual is strongly ill-advised, as reduced level of fluency, or 'kitchen' language fluency within day to day settings is not adequate to conduct a clinical interview or cognitive assessment, and may make it very difficult to understand critical facts in the history or clients' responses (Artiola i Fortuny, 2004). Untrained interpreters may make omissions, additions, or substitutions to the statements of both interviewer and patients. In addition, the seriousness of a cognitive deficit or change in emotions may be minimized or exaggerated by the untrained interpreter (Suzuki, Meller & Ponterotto, 1996).

The primary role of the interpreter is to act as a conduit in all forms of communication between the examiner and the interviewee. Interpreters are defined as people who translate oral communication from one language to another (Suzuki, Meller & Ponterotto, 1996). Although interpreters within an Australian health care setting are required to be trained for working within this level, clinical experience has indicated that there is a range in professionalism exhibited by interpreters. For example a WAIS-III Similarities item was interpreted in Italian by a qualified interpreter in the following manner; "How are the colours black and green alike?" Not only was the item itself changed, but the answer was also provided to the patient. Other comments by interpreters have included "he does not have dementia!", "do you have to ask him these questions, he can't do it" and badgering of the patient "you know what a circle is!" (personal experience). In

addition, some patients (especially from linguistic groups with few members in the locality) may be uncomfortable discussing issues with an interpreter present as they may know them socially.

Qualified interpreters do have various levels of fluency and competency, and a monolingual professional has no way of personally verifying the qualifications of the interpreter and knowing whether the assessment is being conducted in a standardised manner. Therefore, errors that could be grave are unlikely to be detected by the monolingual clinician, and errors in measurement may result in diagnostic errors (Artiola i Fortuny, 2004). Even when the clinician uses an interpreter with advanced fluency, the clinician is once removed from direct contact with the patient. He or she must then depend on the interpreter for crucial diagnostic information which an interpreter is not trained to recognise (Artiola i Fortuny, 2004). Inability to communicate directly with the patient creates imprecise assessment of not only the patient's statements, but also of the actual wording, the form and the content. This can impact on the clinicians' ability to effectively assess mood, affect, degree of cooperation, language and cognition itself (Artiola i Fortuny & Mullaney, 1998).

Investigators have argued that in verbal cognitive tasks, particularly verbal memory tests, linguistic problems although they may seem minor could lead to major pitfalls in studies comparing cognitive function in populations with differing languages. Verhey et al. (2004) stated that there was a need to use harmonised versions of instruments for rating dementia in multinational studies. Similarly, Demers, Robillard, Lafleche, Nash, Heyman

and Fillenbaum (1994) argued that given the increasing number of international and epidemiological studies of Alzheimer's disease there is a need for linguistically equivalent translations of measures for identifying the presence, types, and severity of dementia in cross-cultural populations. In translating the CERAD (Consortium to Establish a Registry for Alzheimer's Disease) neuropsychological instruments into French, the authors noted several linguistic issues such as semantic, phonetic, and word-frequency problems.

Artiola i Fortuny and Garolera, et al. (2005) commented that verbal material used to assess the cognitive abilities of Spanish speaking individuals in the U.S.A is frequently of linguistically unacceptable quality. The use of these materials in research settings was put forth as a serious threat to test validity and a threat to the validity of results or conclusions. Researchers have also reported that inherent language biases and lack of saliency of a number of tests also impact upon CALDI performance on tests of cognition. Loewenstein, Arguelles, Barker, and Duara (1993) reported that these issues contribute to the lower performance of elderly Cubans on the Comprehension and Digit Span subtests of the WAIS-R.

Given that verbal fluency tests are used extensively in clinical neuropsychological assessments, as well as in research protocols, and that category fluency tasks are an important component of neuropsychological assessment, especially when evaluating for dementia syndromes, it has been argued that language biases need to be taken into consideration when assessing CALDI (Acevedo & Loewenstein et al., 2000).

Furthermore, differences in verbal fluency scores among various languages can be attributed to a multitude of factors. In a comparative study of bilingual individuals in New York, investigators found that Spanish speakers produced the smallest number of words compared to Chinese and English speakers, while Vietnamese speakers generated the most words (Dick et al., 2002). The authors attributed this finding to the difference in word length of animal names in each language (Kosmidis, Vlahou, Panagiotaki, & Kiosseoglou, 2004). Similarly, a study comparing French and English speaking Canadian patients on the “FAS” test reported significantly lower scores in the former compared to the latter group (Steenhuis & Ostbye, 1995). It has also been reported that elderly Cubans often score lower on the Controlled Word Association (FAS) because of different frequencies of letters occurring in the Spanish versus the English language, and also because of fewer phonetic cues to guide them (Arguelles, & Loewenstein, 1997).

In summary, language, or verbal communication is central to neuropsychological assessment. Language differences exist both between and within cultural groups and issues relating to language dominance and proficiency need to be considered when interpreting CALDI cognitive test performance. Furthermore, cross cultural researchers have highlighted a number of difficulties related to retaining original test properties such as reliability and validity when translated and administered by interpreters.

1.9 Effects of Education on Neuropsychological Test Performance

A common finding in cross cultural research is that performance on cognitive tests improves (that is, becomes more like that expected by the test maker or test

administrator) as the test taker becomes more acculturated to the society of origin of the tests. As noted previously the use of such tests among cultural groups in various parts of the world and among ethnic groups in plural societies continues to be criticized and the results continue to be open to numerous interpretations. One point of view about such results is that there isn't a substantive shift in cognitive functioning per se, only a superficial change in performance due to learning some "test taking tricks" (for example, familiarity with the language of the test or with test like situations). Another point of view is that there may indeed be new cognitive qualities or operations that develop with acculturative influences such as literacy or industrialization. However, researchers have also proposed that test performance may improve due to interplay of these factors (Berry, Poortinga, Segall & Dasen, 2002). Test-wisness, the impact of demographic variables, and in particular the impact of differing levels of education, on neuropsychological test performance will be discussed in the following sections. In addition, the link between low education level and higher risk of dementia will also be discussed.

Nell (2000) argued that formal schooling plays an integral role in psychometric test performance. He highlighted that the elements of classroom skill that contribute to test performance, and a test-wisness, include practice using writing tools, facility with letters, numbers, and other symbols; and an appreciation of the importance of paying attention, obeying instructions, and sitting still as contributors to speed and accuracy of work. Nell stated that practice facilitates test-wisness in both task comprehension and task solution. He proposed that all test participants should be given enough practice for optimum performance in terms of both ability to respond to novelty and degree of

automatic task comprehension. La Rue (1992) noted that low scores on cognitive testing obtained by poorly educated or inactive people may reflect reduced opportunity in everyday life to use the types of information processing required by novel and abstract tests.

It is widely accepted that demographic variables such as age, gender and education can impact upon cognitive test performance and test norms are developed in order to account for these influences (Mitrushina, Boone, Razani, & D'Elia, 2005; Lezak, 1995; Spreen & Strauss, 1998; Heaton, Ryan, Grant, & Matthews, 1996; Ivnik, Smith, Petersen, Boeve, Kokmen, & Tangalos, 2000; Lucas, Ivnik, Smith, Ferman, Willis, Petersen, & Graff-Radford, 2005; Vangel, Lichtenberg, & Ross, 1995; Ardila & Rosselli et al., 1989). Artiola i Fortuny (2004) highlighted the difficulties in delineating which of the various demographic factors predominantly accounts for the differences by CALDI on tests of cognition. For instance, performance on verbal fluency tests is influenced by both the contribution of age and education to word production (Cohen & Stanczak, 2000; Crossley et al., 1997; Kempler et al., 1998; Tombaugh et al., 1999; Tomer & Levin, 1993). Heaton and his colleagues (1996) emphasized the importance of norms that stratify subject groups not only on each individual demographic variable, but also on such factors in combination. Although normative studies have attempted to include participants with as little as six years of formal schooling, the majority of these studies have been conducted with participants with a high level of education (Heaton, Grant, & Matthews, 1991; and Heaton, Avitable, Grant, & Matthews, 1999).

While the effects of age and gender on test performance has been known for a number of decades, quantification of the effects of education on test norms has been occurring fairly recently (Artiola i Fortuny, 2004). However, education has been found to be significantly related to performance on most neuropsychological tests examined for this effect (Mitrushina, Boone, Razani, & D'Elia, 2005; Spreen & Strauss, 1998). Nell (2000) reported that level of education has been demonstrated to be positively linearly related with test performance. Interestingly, the author noted that in the youngest age groups, where no education effects exist, scores in different cultures converge more than at a later age.

Ostrosky, Ardila, Rosselli, Lopez-Arango, and Uriel-Mendoza (1998) examined the effect of education on neuropsychological test performance across different age ranges on the Spanish version of the NEUROPSI test battery. Results indicated a significant education effect on most of the tests. For some tests, just one or two years of formal education resulted in significantly better test performance. This effect was noted particularly on tasks assessing language understanding, phonological verbal fluency, and conceptual abilities (the ability to find similarities). Aging effect was noted in visual perceptual, visual constructional and memory scores. The authors concluded from their studies that education affected test performance more so than age.

Although there can be differences in absolute levels of performance, cross-cultural studies generally show that neuropsychological tests have similar sensitivities to clinical disorders across western cultures at the high end of the education continuum (Crook,

Youngjohn, Larrabee, & Salama, 1992; Klove, 1974; Van der Vlugt & Satz, 1985). Along these lines, Levav, Mirsky, French, and Bartko (1998) obtained neuropsychological assessment data on persons from five countries (U.S.A., Canada, Ecuador, Iran and Israel) whose ages ranged from 8 to 90 years. Participants were assessed in four different languages. Results indicated that reaction time measures obtained in tests of sustained attention were minimally affected by country of origin and level of education. However, tests assessing the ability to focus attention and solve a problem, shift strategies, and inhibit an automatic response tendency differed significantly by country and level of education. The authors concluded that their data provided partial support for the hypothesis of commonality of some cognitive functions across cultures. Despite this, Stricks, Pittman, Jacobs, Sano and Stern (1998) stated the use of neuropsychological tests in CALD populations, in particular among those with low education, is limited as most test norms have been standardised for English-speaking populations with relatively high levels of education.

In keeping with Levav, Mirsky, French, and Bartko (1998) findings, Ostrosky, Ardila, Rosselli, Lopez-Arango & Uriel-Mendoza (1998) also reported that when comparing a large enough range of education, that the educational effect on neuropsychological test performance is minor among subjects with relatively high educational levels. The authors stated that the effects of education are most noticeable when comparing individuals with zero and three years of education where performance differences on tests of cognition are highly significant. They noted that performance differences between individuals with three and six years of education tend to be smaller and so forth. Bornstein, Suga and

Prifitera (1987) examined the incidence of Verbal IQ and Performance IQ discrepancies at various levels of education. They reported that in subgroups with fewer years of education the incidence of discrepancies with higher Performance IQs was twice as common as that with higher Verbal IQs and that the opposite pattern was observed in the subgroups with higher educational levels.

Although most cognitive screening tools are regarded by western, educated and industrialised nations as tests that contain very simple and basic items, international studies have reported that performance on such measures, for instance on the MMSE (Folstein, Folstein, & McHugh, 1975), is affected by educational level, age and ethnic affiliation (Fillenbaum, Heyman, Williams, Prosnitz, & Burchett, 1990; Launer, Dinkgreve, Jonker, Hooijer, & Lindeboom, 1993; Murden, McRae, Kaner, & Bucknam, 1991; Srivastav, Agarwal, & Kumar, 1989). Weiss, Reed, Kligman, and Abyad (1995) examined the relationship between MMSE scores and literacy in a sample of 214 participants aged from 60 to 94 years of age. Mean education level was 10.3 years with a range of 0 to 20 years of education. Participants reading levels ranged from Grade 0 (nonreaders) to 8th Grade reading skills. The investigators reported that multiple regression analysis using reading levels, education, age, and ethnicity as independent variables and MMSE score as the dependent variable, found the highest correlation between MMSE score and reading level. Educational level made only a small contribution and age and ethnicity did not reportedly enter the regression equation. Given their findings, the researchers concluded that literacy level was more important than

education and stated that literacy may be the most important socio-demographic variable known to affect MMSE scores.

Cognitively intact individuals with low levels of education can score lower than highly educated patients with mild impairments (Ardila, Rosselli & Rosas, 1989). Due to these findings a number of recent English language studies indicate that demographic corrections and caution must be applied when assessing individuals with very low levels of education, as deceptively high false positive rates can be assigned among low-educated individuals (Axelrod & Goldman, 1996; Marcopoulos, Gripshover, Broshek, McLain, & Brashear, 1999; Richardson & Marottoli, 1996; Sherrill-Pattison, Donders, & Thompson, 2000; Shuttleworth-Jordan, 1997; Vangel & Lichtenberg, 1995). For instance, research on the MMSE has indicated that persons with fewer than 8 years of education often score below the cut off originally suggested for indicating cognitive impairment (Holzer, & Tischler, et al., 1984). Brayne and Calloway (1990) reported that education level was the most significant variable accounting for the highest score variance in MMSE performance with subjects of only 8 years of education. Marcopulos, McLain and Giuliano (1997) investigated the cognitive performance of healthy, community dwelling, rural, older adults with 10 or fewer years of education in the U.S.A. on various cognitive measures. The authors reported that approximately half of their sample obtained scores below the MMSE cut off score of 24. Similarly approximately half of their sample also scored below the Mattis Dementia Rating Scale (MDRS) cut off score of 137. The authors concluded that it was not advisable to use current norms within a rural population with low levels of education and that their findings concurred with previous research on

the MMSE showing that persons with fewer than 8 years of education often score below the cut-off originally suggested for detecting cognitive impairment. Previous researchers (Murden, McRae, Kaner & Bucknam, 1991) have recommended use of a cut off score of 17/18 instead of 23/24 for dementia screening for subjects with less than 8 years of education. Nevertheless, Marcopulos, McLain and Giuliano (1997) stated that even when using a cut-off of 17, 11% of their healthy community dwelling older adults sample, with 10 or fewer years of education, would be considered cognitively impaired.

Education has also been reported to be an important predictor of performance on a variety of cognitive tests such as the MDRS, Clock Drawing, Ravens' Colored Progressive Matrices, WAIS-R subtests, such as Vocabulary and Block Design, Verbal Fluency (category), the Logical Memory and Visual Reproduction subtests from the Wechsler Memory Scale-Revised (WMS-R), and the Halstead-Reitan Neuropsychological Test Battery (Marcopulos, McLain & Giuliano, 1997; Ostrosky-Solis, Lopez-Arango, & Ardila, 2000; Fillenbaum, Heyman, Williams, Prosnitz, & Burchett, 1990; Bornstein & Suga, 1988; Escobar, Burnam, Karno, Forsythe, Landsverk & Golding, 1986; Ravaglia, et al., 2003). Marcopulos, McLain and Giuliano (1997) cautioned that older and less educated cognitively normal individuals may be misclassified as impaired or brain-damaged on neuropsychological tests when standard cut off scores are used. The authors argued that the test performance of normal elderly persons with low level of education (less than 8 years) is most likely to be misinterpreted as representing a dementia (Stern et al., 1992).

Given that cognitive changes occur with normal aging, it has been noted that mild cognitive changes in low educated people may result in the erroneous diagnosis of dementia (Ardila, Ostrosky-Solis, Rosselli, and Gomez, 2000). Researchers have cautioned against the assumption that no or low education equates to these individuals having a form of lifelong cognitive impairment. For instance, if an individual with little or low formal schooling was being assessed many neuropsychologists would estimate their premorbid level of functioning to be below average, likely within the 'Low Average' range. Ardila, Ostrosky-Solis, Rosselli, and Gomez, (2000) highlight that this assumption supposes that what is normal is to be educated, that no or low education is a form of abnormality or impairment. The authors stress that most of the world population has low levels of education, and about one third of the world people are currently illiterate (Unicef, 1995; cited in Ardila, Ostrosky-Solis, Rosselli, and Gomez, 2000). They also highlighted that literacy is a relatively recent phenomenon in terms of our world history given that one or two centuries ago, most of the world population was illiterate. They argue that low education or illiteracy is not an abnormality from the statistical point of view. They also argue that they do not consider people with low education to be under-stimulated; indeed, they consider highly educated people to be over-stimulated, from the perspective of some specific cognitive tasks. The investigators emphasise that this manner of thought may be crucial in perceiving and interpreting pathology, and argue that when diagnosing individuals with low levels of education, functional scales need to be incorporated and adapted for use with the low educated persons (Loewenstein & Ardila et al., 1992).

1.9.1 Low Education Level and Higher Risk of Dementia

Cross-cultural epidemiological studies have found that persons with low education tend to be more likely to be classified as demented (Mortimer & Graves, 1993). Cognitive reserve, the brain's ability to tolerate effects of dementia pathology, has been suggested as the mechanism for the link between low education and higher risk of dementia (Katzman, 1993; Mortimer & Graves, 1993; Satz et al., 1993; Stern 2002; Satz, 1993). For example, Craik, Byrd, and Swanson (1987) found that participants with low levels of education presented with an earlier decline in memory abilities when compared with those with high levels of education. Researchers have suggested that cognitive reserve could result from a number of mechanisms. It has been hypothesised people with high socioeconomic status and increased education may have a greater resistance to the effects of the dementing process, either because their better premorbid intellect reflected a higher level of neural reserve in terms of synaptic density or complexity and that this would enable the brain to compensate for pathology through more efficient use of existing cognitive networks or recruitment of alternative networks (Stern, 2002). It has also been suggested that people with high socioeconomic status may have a greater resistance to the effects of the dementing process because they tended to seek more stimulating environments, which help to prevent a decline in cognitive skills (Jorm, 1990; Ardila, Ostrosky-Solis, Rosselli, & Gomez, 2000; Manly, Touradji, Ming-Xin, & Stern, 2003).

On the other hand, it has been hypothesised that the link between low social status and dementia may be due to a higher rate of vascular and secondary dementia in people from poor environments (Bickel & Cooper, 1994). Other studies, however, found no link

between lower education levels and the diagnosis of dementia, even though their participants had difficulties with cognitive testing (O'Connor, Pollitt, & Treasure, 1991). Ardila, Ostrosky-Solis, Rosselli, and Gomez, (2000) argued that the clinical observation of illiterates and low educated populations does not seem to confirm the hypothesis that dementia is significantly higher in individuals with low education. The authors stated that in neurological settings in developing countries, dementia seldom represents a reason for consultation in low-educated people. They also commented that everyday observation suggests that most low-educated and illiterate individuals continue to be functionally active during their 60's, 70's, and even their 80's and 90's. However, they noted that it would be useful for this observation to be formally documented.

Manly et al., (2003) reported that two large international studies investigating incidence of dementia found that illiteracy or low levels of education did not increase the risk of AD among elders in India (Chandra et al., 2001) and West Africa (Hall et al., 1998). The authors reported that although a large proportion of these populations lacked formal schooling, or literacy training, the studies reported low prevalence and incidence rates of dementia. Manly et al., (2003) stated that this paradox demonstrated the difficulty in comparing cultural groups from different backgrounds. The authors also emphasised that cognitive reserve is measured by indirect variables (such as years of education, occupational level, or IQ measures), and that there are a number of ways in which cultural and economic factors may affect the predictive power of these indirect variables.

Although diagnosis of dementia requires not only a psychometric but also functional criterion, neuropsychologists often rely heavily on psychometric procedures. Cross cultural researchers highlight that this approach may result in a penalisation for low educated individuals and may inflate the measures of the severity of the cognitive decline, and hence, estimates of the prevalence of dementia. Consequently, it has been recommended that not only psychometric, but also functional criteria of cognitive functioning should always be taken into consideration (Ardila, Ostrosky-Solis, Rosselli, & Gomez, 2000).

Clearly these concepts regarding the relationship between education level and risk of dementia require further clarification and systemic empirical research (Orrell & Sahakian, 1995). However, Marcopulos, McLain and Giuliano (1997) caution that when investigating the link between level of education and risk of developing dementia researchers need to consider the validity of the cognitive measures used to determine impairment in low education elderly samples. The authors stated that, given their findings, it may be “premature to conclude that rural-dwelling elderly adults with low education have a higher incidence of dementia precisely because the tests used to measure cognitive impairment may overestimate impairment in this population.” Similarly, Manly et al., (2003) purported that years of education may not be an accurate representation of cognitive ability among immigrant elders whose educational opportunities were limited due to their migrant experience. The authors stated that despite strong intellectual abilities migrants may not achieve academic or occupational success because their opportunities are limited by societal forces beyond their control. The

authors also noted that although such individuals may be powerful or influential in their community, their abilities may not be reflected in years of schooling or traditional indicators of occupational status.

Although years of education tends to be linked to literacy level, years of education does not necessarily equate to level of literacy, and may not be an appropriate indicator of knowledge, strategy, and skill that are accompanied by formal schooling. Manly et al., (2003) reported that there is discordance between years of education and quality of education among CALDI. They reported that previous studies revealed that elderly African Americans have reading skills significantly below their self-reported education level (Manly & Jacobs, 2002; Manly et al., 2002). These discrepancies were reportedly related to the inferior funding of segregated Black schools as compared to White Southern schools and most integrated Northern schools (Manly et al., 2003). In addition, Nell (2000) also notes that there are cultural differences in the way that individuals are taught. In some cultures there is an emphasis for independent problem solving and critical thinking, whereas in other cultures the emphasis is on rote learning and memorisation of facts and events. Manly, Byrd, Touradji, Sanchez and Stern (2004) argue that the use of years of education to represent a direct effect of experience on the brain or cognition is problematic when used among CALD migrants due to the quality of education among these groups. Many migrants due to societal factors, such as poverty following the Second World War, may have had poor access to education, and their attendance would likely have been sporadic and in most cases their education would have been disrupted.

Hence, literacy rather than years of education may better reflect performance ability on tests of cognition.

In summary, researchers argue that education and cognitive test performance are positively linked. It is unclear whether low education is a risk factor for developing dementia or whether the tests used to measure cognitive impairment may overestimate impairment in this population. However, given that cross cultural studies have reported high false positive rates among normal low-educated CALDI, caution has been recommended when assessing individuals with very low levels of education. In addition, due to discordance between reported years of education and literacy skills among CALD elders, researchers highlight that literacy rather than education may better reflect performance ability on tests of cognition.

1.10 Literacy Level and Cognitive Test Performance

Nell (2000) stated that persons who are not fully literate are variously described as illiterate, functionally illiterate, or semiliterate. Illiteracy refers to the inability to read and write letters and numbers and name them fluently. Functional illiteracy refers to individuals who can sign their name and read a text at grade school level, but who for example are unable to independently follow a recipe or the instruction sheet enclosed with a product. The term semiliterate is used both for functionally illiterate individuals and those who exceed this definition in that they can say the alphabet, albeit non-fluently, and comprehend simple written materials. However, they cannot fluently perform tasks like generating words to a given letter, serial subtraction, or the analogical reasoning

required for multi-step arithmetic problems and syllogisms, skills which Nell argued are fully developed in high school. He also stated that literacy level is a good indicator of westernisation, which itself has been a difficult concept to define given that it can have different meanings in different settings. Overall, in the current context it tends to relate to industrialised, developed nations, with high standard of living and moderate levels of education within the population. The focus of this section is to review studies investigating different types of literacy and their effect on cognitive test performance. In addition, the current section will also review studies linking literacy to changes in the organisation of cognitive processes in the brain. Following this, literacy level and performance on nonverbal tests, as well as, context specific cognition and the influence of cognitive style on cognitive test performance will be reviewed. Furthermore, ecologically valid measures of cognitive functioning in illiterates and individuals with low levels of education will be discussed. Lastly, measures of literacy level and the influence of mass media, socialisation and acculturation in mainstream urbanised society will be briefly outlined, in particular the impact of these on functional literacy and test performance will also be discussed.

1.10.1 Different Types of Literacy and Effect on Cognitive Test Performance

Scribner and Cole (1981) explored, through a wide array of research methodologies, the impact of literacy among the Vai in West Africa on cognitive functioning. The investigators contrasted different types of literacy, each tied to a particular language (English/school, Vai script, and Arabic language) and to a variety of practices. Among the Vai people they were able to find samples of persons who were literate in the Vai

script but who had not attended formal schooling, thus eliminating the usual confound between schooling and literacy as contributors to cognitive test performance. Using a battery of tasks covering a wide range of cognitive activity, such as memory and logical reasoning, the authors sought to challenge the idea that literacy transforms the intellect in a general way. They found that there were no general effects of literacy, but there were some specific test performances that were related to particular features of the Vai script. They concluded from their studies that the consequences of literacy were intimately bound up with the nature of the specific social practices of its users. Their conclusion that particular forms of literacy have local, culture-specific cognitive consequences as opposed to sweeping transformations of cognitive functioning has often been cited in context-specific studies of literacy.

A replication of this study was carried out by Berry and Bennett (1989) among the Cree of Northern Ontario. Once again, literacy was present in a form (a syllabic script) that was not associated with formal schooling. The results of this study also found no evidence for a general cognitive enhancement (assessed by an elaborated version of Raven's Progressive Matrices), but some evidence for abilities that involved the same mental operations (rotation and spatial tasks) that are important in using this particular script. A sub-sample of participants with formal Western-style schooling was administered a battery of cognitive tests, including general, spatial, language and reading abilities. Multiple regression analyses demonstrated the clear relative importance of the experience of formal schooling over syllabic script literacy on test performance. However, this influence of schooling was variable, with greater influence on general and

English language abilities, and lesser influence on spatial abilities. In addition, there was a negative influence of schooling on syllabic reading ability. Although in these studies on the effects of literacy there was no evidence that a major shift in ways of thinking had taken place, all cognitive test performances were found to be positively correlated with years of formal Western-style schooling, which was proposed to be due to acculturation factors. Scribner and Cole (1981) stressed that schooling and the acquisition of literacy should not only be distinguished conceptually but also may be separable in practice, as literacies developed and used in different contexts tend to produce correspondingly differentiated patterns of cognitive competence.

1.10.2 Literacy and Changes Related to the Brain Organisation of Cognition

A number of investigators have attempted to describe the influence of literacy level on specific neuropsychological measures as a reflection of underlying brain function. Several authors have reported that learning to read and write generates new rules within the language processing systems and that that these new rules significantly change the manner in which some operations are performed by influencing the functional organization of the human brain. The knowledge of reading and writing has effects on several cognitive process including visual processing, cross-modal operations (audio-visual and visuotactile), and interhemispheric crossing of information (Reis & Castro-Caldas, 1997). It has also been reported that the organisation of cognitive processes such as abstraction, inference and memory depends on the type of symbols, or writing system, used by the individuals in their environment (Ostrosky-Solís, 2004). Petersson, Reis and Ingvar (2001) reported that both behavioural and functional neuroimaging data are

consistent with the hypothesis that the functional architecture of the brain is modulated by literacy. For instance, functional neuroimaging data has indicated inter-hemispheric regional cerebral blood flow differences in the posterior parietal cortex between two literacy groups. The authors reported that these inter-hemispheric connections between the left and right posterior parietal cortices were larger in literate compared to illiterate subjects, and stated that they reflect an effect of formal schooling. The authors concluded that the acquisition of written language skills significantly modulates the spoken language system. However, they noted that it is still unclear which processes and which mechanisms mediate the influence of literacy on cognition.

Neuroimaging studies indicate several differences between groups of literate and illiterate participants including, thinner corpus callosum in the illiterate group in the segment where the parietal lobe fibres cross, different processing within the parietal lobe of both hemispheres, and slower processing of information within the occipital lobe in individuals who learned to read as adults. In addition, while dealing with phonology, a complex pattern of brain activation was only present in literate subjects (Castro-Caldas et al., 1999; Castro-Caldas & Reis, 2000).

Ostrosky-Solís, García, and Pérez (2004) assessed the extent of activation of cerebral hemispheres during a verbal memory task in literate and illiterate subjects using cortical evoked potentials to a probe click stimulus. Left-hemisphere attenuation during the experimental condition was found in both groups. However, during the verbal memory task, significant intrahemispheric differences between groups were found at parieto-

temporal areas. The authors stated that their results indicated that although left hemisphere predominantly mediates language processing, learning how to read and write demands an intrahemispheric specialization with an important activation of parieto-temporal areas. They concluded that their data supports the view that the brains of illiterate subjects show patterns of activation that are different from those of literate subjects, thus reflecting that environmental conditions can influence brain organization.

Literacy has also been linked with changes related to the brain organisation of cognition. Educational and cultural variables may affect not only handedness (Ardila et al., 1989) but also the degree of hemispheric dominance for language and possibly other cognitive abilities. Studies of brain damaged illiterates when compared to brain damaged literates have indicated that although literacy does not change the dominance of the left hemisphere for language, it appears that the right hemisphere has more participation on language in illiterates (Rosselli, 1993). In general, left hemisphere damage in literates results in a higher number of errors in aphasia tests than left hemisphere damage in illiterates (Lecours et al, 1988, Matute, 1988; cited in Ostrosky-Solis, Ardila, Rosselli, Lopez-Arango, & Uriel-Mendoza, 1998). In addition, right hemisphere damaged illiterates more frequently present with lower performance in aphasia tests than right brain damaged literates (Lecours et al, 1987a, 1987b). Ardila (1995) also reported that hemi-spatial neglect has been reported to be more frequently observed with left-hemisphere pathology in individuals with a learning history of low verbal training, but normal, and sometimes superior, training in spatial abilities.

Castro-Caldas, Reis and Guerreiro (1997) reviewed neuropsychological aspects of illiteracy and cautioned that the use of some tests for assessing aphasia should be avoided in illiterate populations due to the lack of test validity. For instance, Lecours, Mehler, Parente, and Caldeira, (1987) found highly significant differences in the results of healthy illiterate participants as opposed to healthy literate participants when tested with relatively simple pointing, repetition and naming tests. The investigators argued that testing brain-damaged CALDI risks overestimating the frequency of aphasia if educational level and literacy are not taken into account.

1.10.3 Literacy Level and Performance on Verbal and Nonverbal Tests of Cognition

Reading and writing ability has been reported to affect neuropsychological test performance on both verbal and nonverbal tests of cognition. Illiterate participants have obtained lower scores on measures of several language tasks including tasks such as naming, comprehension, verbal abstract reasoning, orientation, and repetition of pseudowords (Manly & Jacobs et al., 1999; Manly, Byrd, Touradji, Sanchez & Stern, 2004). Illiterates were also worse at memorizing pairs of phonologically related words compared to pairs of semantically related words, illiterates were also unable to generate words according to a formal criterion, had difficulty with the recall of phonologically related word associates, and had difficulty with word list, sentence and story recall, phonemic or letter fluency tasks, visual naming of objects in photographs, and auditory comprehension (Lecours, Mehler, Parente, & Caldeira, 1987; Reis & Castro-Caldas, 1997; Reis, Guerreiro, & Castro-Caldas, 1994). Researchers concluded that the lack of grapheme-phoneme correspondence by illiterates explained their performance on these

language based tasks. It was also noted that illiterate persons use strategies useful for semantic processing, but inadequate for phonological analysis, while literate individuals are able to use several parallel running strategies. Furthermore, effects of reading and writing ability have been reported on measures of time-telling, and on other tasks such as formal operational thinking, logical reasoning, remembering strategies, digit span, calculation, buccofacial and ideomotor praxis, finger alternating movements, and cancellation tasks (Ardila, Rosselli, & Rosas, 1989; Rosselli, Ardila & Rosas, 1990; Petersson, Reis & Ingvar, 2001; Ostrosky-Solis, Ardila, Rosselli, Lopez-Arango, & Uriel-Mendoza, 1998).

Studies comparing the performance of literate and illiterate individuals on tests of cognition also found that illiterate individuals performed poorly on tests of drawing, including on tests of line drawings of objects, and recognition of superimposed figures, stick constructions, figure matching and recognition, figure memory, visuospatial ability (for instance copy of simple and complex figures), and visual perception (Manly & Jacobs et al., 1999; Manly, Byrd, Touradji, Sanchez & Stern, 2004; Ostrosky-Solis, Ardila, Rosselli, Lopez-Arango, & Uriel-Mendoza, 1998).

Performance differences between literate and illiterate individuals on tests of cognitive functioning were hypothesised to be due literate's successfully using linguistic skills to mediate nonverbal tasks. Researchers also reported that literates have better developed skills in organisation and analysis of certain types of visuospatial information. Furthermore, it was also noted that line drawings may be more ambiguous or less

recognisable for illiterates, and thus more difficult to name even with a stimulus cue (Manly & Jacobs et al., 1999; Manly, Byrd, Touradji, Sanchez & Stern, 2004; Ostrosky-Solis, Ardila, Rosselli, Lopez-Arango, & Uriel-Mendoza, 1998). Additionally, performance differences were also proposed to be due to illiterates having less exposure to, or familiarity with, the test items as a result of their reading limitations (such as accordion or harp). Manly, Byrd, Touradji, Sanchez and Stern (2004) proposed that illiterates may have performed poorly on the verbal abstract reasoning task (WAIS-R Similarities subtest) due to their cognitive style, that is they may have focused on more practical, concrete aspects of the items, or that they lacked the vocabulary to obtain higher scores.

Rosselli (1993) reviewed brain organisation, and the cognitive sequelae of brain pathology in illiterates and concluded that cognitive abilities, as measured by standard neuropsychological tests, are significantly associated with schooling background. It was noted that educational and cultural variables may affect the degree (but not the direction) of hemispheric dominance for language, and other cognitive abilities. Consequences of brain damage in illiterate samples evidence a more bilateral representation, not only for linguistic but also for visuospatial abilities. (Rosselli, 1993). Given that psychometric tests assess abilities that are strongly school-dependent, Ardila (1995) argues that it is a mistake to assume that the inability to perform simple cognitive tasks as those incorporated in current neuropsychological test batteries, necessarily means abnormal brain function. It is highlighted that the degree of literacy can often represent the crucial variable (Ostrosky-Solis, Ardila, Rosselli, Lopez-Arango, & Uriel-Mendoza, 1998).

Ardila, Ostrosky-Solis and Mendoza (2000) investigated the effect of learning to read on neuropsychological test performance. They administered a neuropsychological test battery to a sample of illiterates in Mexico prior to, and after, a learning to read program. The authors reported that performance on neuropsychological testing had significantly improved following the learning to read training program. The investigators reported that gains were significantly higher in Orientation in Time, Digits Backward, Visual Detection, Verbal Memory, Copy of a Semi-Complex Figure, Language Comprehension, Phonological Verbal Fluency, Similarities, Calculation Abilities, Sequences and recall of learnt information. The authors interpreted their findings as providing support for the assumption that reinforcement of those abilities in which illiterates significantly underscore results in a significant improvement in neuropsychological test scores and strongly facilitates the learning-to-read process.

1.11 Context Specific Cognition and Cognitive Style

Research has indicated that although low schooled or illiterate individuals perform poorly on cognitive tests they are able to successfully perform similar cognitive tasks in their everyday life. Carraher, Carraher and Schliemann (1985) reported that performance of children with few years of schooling (ranging from 1 to 8 years) on mathematical problems embedded in real-life contexts, such as selling fruit at the local market, was superior to that on school-type word problems and context-free computational problems involving the same numbers and operations. In addition, Carraher, Schliemann and Carraher (1988) explored the relationship between concepts and the circumstances of learning by reviewing studies with children, construction foremen working with scales on

blueprints, and fishermen calculating the price and ratio of processed and unprocessed seafood. The authors noted differences between procedural and conceptual knowledge and concluded that social situations are a strong determinant of which symbolic representations are used in problem solving. This context specific notion of cognition has been referred to as contextualised cognition or everyday cognition (Berry, Poortinga, Segall, & Dasen, 2002; Segall, Dasen, Berry, & Poortinga, 1999). Neisser et al. (1996) argued that the cultural environment, that is how people live, what they value and what they do, has a significant effect on the intellectual skills developed by individuals. He noted that studies comparing American controls to rice farmers in Liberia at estimating quantities of rice (Gay & Cole, 1967) and to children in Botswana at remembering stories (Dube, 1982) reported that these groups far outperformed the American controls on these tasks. Neisser et al. noted that in contrast, Americans and other Westernised groups typically outperform members of traditional societies on psychometric tests, even those designed to be “culture-fair.”

Scribner and Cole (1981) proposed that individuals would do things well that are important to them and that they have the opportunity to do often. The authors and their colleagues have produced a large number of empirical studies and literature reviews of investigations carried out among Kpelle schoolchildren and adults in Liberia and American subjects in the U.S.A. concerned with mathematics learning, quantitative behavior, classification, memory and logical thinking. For instance, with respect to Kpelle precision in measurement (for example, of rice in a market setting), the experimenters reported that Kpelle people are masters at measuring rice. For this area of

their experience, they have a highly developed vocabulary and a system of measurements that is completely consistent. However, when measuring distances or lengths, the vocabulary was noted to be less detailed, and very often noninterchangeable units of length depended upon the kind of object or distance being measured. The investigators concluded that measurement is used where it is needed and that measurements are approximate unless there is a real need for exactness. Their general conclusion from these and many similar studies in areas such as infant development, perceptual skills, communication, classification, and memory is that much of the Kpelle cognitive behavior is “context-bound” and that it is not possible to generalize cognitive performances produced in one context to other contexts (Berry, Poortinga, Segall, & Dasen, 2002).

Although context is considered to dictate what knowledge should be used to develop certain abilities, and what knowledge should be neglected, as these do not conform to that culture’s definition of intelligence (Nell, 2000), other researchers take the view that context influences individuals cognitive styles. Cognitive style refers to an individuals “how” (stylistic) rather than “how much” (ability) aspects of a person’s cognition (Berry, Poortinga, Segall, & Dasen, 2002). The cognitive styles approach proposes that the underlying cognitive processes are common to all groups, but due to the demands of a given situation, cognitive processes are differentially developed and this leads to a different pattern of cognitive abilities. The most influential conceptualization of cognitive style has been the dimension of field-dependent/field independent (FDI) cognitive style. This construct refers to the extent to which an individual typically relies upon or accepts the physical or social environment as given (field dependent), in contrast to working on

it, for example by analyzing or restructuring it (field independent). Berry and colleagues have conducted numerous studies of the FDI construct within a ecocultural framework, where relationships between ecological, cultural and acculturation variables have been investigated in relation to cognitive style in CALD groups such as the Inuit, North American Indians, indigenous groups in India, and African Pygmy and agriculturists (Berry, Poortinga, Segall, & Dasen, 2002). Berry, Poortinga, Segall, and Dasen (2002) reported that virtually all of the studies reviewed provided evidence for increased field independence with acculturation experience (contact with other societies, primarily through formal schooling and the experience of industrialization). However, it was unclear whether such experiences fundamentally altered the cognitive style of individuals, or whether they altered the approach to the test materials, through greater familiarity and practice in acquiring “test taking tricks.” The authors highlighted that this finding is similar to previous cross cultural approaches to understanding cognition across cultures, in particular that acculturation and schooling has a profound influence on a person’s cognitive activity.

1.11.1 Ecologically Valid Measures of Cognitive Functioning

Anastasi (1988) stated that the cultural milieu in which an individual is raised in affects the cognitive skills and knowledge that s/he acquires. Interesting examples included the footprint recognition test standardised on Aboriginal Australians and the Draw-a-Horse Test standardised on Pueblo Indian children. Anastasi reported that in both cases the cultural group on which the test was developed excelled in comparisons with other groups. Although there are different theoretical perspectives regarding conceptualisation

of cognition across cultures (whether it is context specific and not generalisable to other situations, or whether it is related to stylistic differences), they all attempt to take into account the individuals' ecological context in terms of their performance on cognitive tasks. Given the diversity of these theoretical perspectives it is difficult to come to a simple summary or conclusion. However, it would appear that cognitive functions and processes are common to all human beings. Although cognitive competencies are developed according to some common rules different ecological contexts can result in highly varied performances due to the interplay of cultural norms and social situations encountered both during socialisation and at the time of testing (Berry, Poortinga, Segall, & Dasen, 2002).

In an attempt to provide a more ecologically valid measure of verbal fluency abilities in illiterates, some investigators proposed the use of tasks that resemble the daily activities typical of illiterates. Petersson, Reis and Ingvar, (2001) and Reis, Guerreiro and Petersson (2003) conducted a series of studies in which the experimenters administered a verbal fluency task using the categories animals and edible supermarket items. They found that illiterates generated fewer animals than literates, but an equal number of supermarket items. They attributed this discrepancy to the abstract nature of the first category, versus the familiarity of the process of generating items in the second category.

Folia and Kosmidis (2003) reported that memory processes in illiterates have also been investigated in several studies and that these have yielded conflicting results. Illiterates reportedly performed comparably to literates on tests of verbal list delayed recall, but

performed more poorly than literates on measures of working memory, as measured by digit span, as well as measures of declarative memory, as measured by word lists, delayed sentence recall, and immediate and delayed short story recall. However, another study reported that there was no difference between illiterates and literates on the immediate memory of sentences, but that illiterates performed more poorly on digit retention, memory curve, delayed verbal recall, sentence repetition, immediate and delayed logical memory, immediate recall of the Rey-Osterrieth complex figure, immediate reproduction of a cube, visuospatial memory and sequential memory. Folia and Kosmidis (2003) highlighted that these tasks are all artificial laboratory tasks which resemble skills trained during schooling and may put illiterates at a disadvantage, as they may rely on processes learned through formal education and not represent the kinds of activities encountered in daily life. The authors also stated that such findings raise the important clinical question of the appropriateness of commonly used neuropsychological tests for assessing cognitive functioning in individuals with low or no education.

Given the potential for over-diagnosing memory difficulties in individuals with low or no education, which is particularly relevant in CALDI, Folia and Kosmidis (2003) investigated the hypothesis that memory deficits in illiterates are an artifact of the assessment tools used rather than an indication of deficient cognitive skills. The researchers designed two tests, a word list learning test (a modified California Verbal Learning Test of 16 common words belonging to four semantic categories) and an object learning test. The illiterate group performed more poorly than semiliterate and literate groups on most variables of the word list learning test, but only on delayed recall and

semantic clustering on the object learning test. The authors concluded that their findings suggested that poor memory performance among illiterates could be attributed both to the nature of the task, as well as, to the use of different cognitive mechanisms to recall learned information. It was argued that formal education may enhance the innate ability of learning through training individuals in efficient learning and retrieval strategies, such as using analytic strategies, planning, and organising output sequences. The authors emphasised the importance of developing and using ecologically valid neuropsychological tests, which take a more functional approach, to assess cognitive functioning in illiterate individuals.

1.11.2 Clients with Low Education, Performance Aided by Access to Mass Media

Literacy level is typically inferred from reported years of education. However, this is considered to be a crude measure of literacy due to differential experiences of educational quality. Researchers have proposed that reading level, rather than years of education, may be a more sensitive predictor of literacy (Shadlen & Larson, et al., 2001). Manly, Byrd, Touradji, Sanchez and Stern (2004) reported that by adjusting for reading level, which is considered to in part reflect quality of education, this overcomes the limitations of years of education as in indicator of educational experience among CALD elders and thus can improve the specificity of neuropsychological measures (Manly, Byrd, Touradji, & Stern, 2004). The investigators also emphasised that differences in organisation of visuospatial information, lack of previous exposure to stimuli, and difficulties with interpretation of the logical functions of language are also likely to affect test performance of elders with low levels of literacy.

Nell (2000) argues that achievement of functional literacy is acquired at the completion of high school education, and that this is the minimum level of literacy required for tests that have well-entrenched numeric, reading, or analogical reasoning skills. Although in Western cultures individuals without high school education are assessed using cognitive tests, Nell argues that this lack of formal education is partially compensated for by the intense socialisation and acculturation experiences offered by technological, media-rich environments in mainstream urbanised society. Kaufman, McLean and Reynolds (1988) used factor analysis to reanalyze the original WAIS-R standardization data and found that African Americans (who constituted 10% of the standardization population) scored significantly below White Americans on every subtest, with Vocabulary and Block Design showing the greatest differences in performance. Given that these subtests were used as a short form for clinical screening the authors promoted caution in using such a screener in this group (Kaufman, McLean & Reynolds, 1988). Interestingly, the authors also reported that there was a significantly better performance by urban than by rural individuals in the 55 to 74 age group on Information, Digit Span, Vocabulary and Arithmetic subtests. Most of these tasks are considered to measure acquired school-related skills. The authors argued that individuals who were born and raised well before World War II (the WAIS-R was standardized from 1976 to 1981) and individuals who grew up in rural areas did not acquire school related skills to the same degree as their contemporaries who grew up in urban environments. The investigators highlighted that this advantage of urban over rural environments did not hold for participants who were raised more recently such as adolescents, young adults, and middle aged adults. They hypothesized that this was due to the impact of mass media and television, which has

recently improved the accessibility of knowledge to people who are growing up in rural areas. This view is consistent with investigators involved in cross cultural comparisons who point to the potential differences in the types of experiences and environmental exposure that individuals may have had in different cultures and from which they tend to derive their responses, such as the natural environment and mass media (Acevedo et al., 2000). Similarly, Nell (2000) reported that data from the U.S.A. National Assessment of Educational Progress over a 20 year period have documented an overall narrowing of the Black-White IQ gap of approximately 5 points. Speculating on these reasons, it was noted that the quality of Black schooling has improved, nutrition and health care have improved, travel opportunities have increased, and the media exposure has reduced the impact of environmental differences (Nell, 2000).

In summary, researchers have reported that learning to read and write can affect the functional organisation of the brain. Neuroimaging studies have also reported anatomical differences between literate and illiterate groups and brains of illiterate individuals were found to have patterns of activation different to those of literate participants, suggesting that environmental conditions can influence brain organisation. Furthermore, effects of reading and writing ability have been noted on a variety of both verbal and nonverbal neuropsychological measures. Interestingly cross cultural researchers have noted that although illiterate individuals perform poorly on cognitive tests they are able to successfully perform similar cognitive tasks in their everyday life. This discrepancy has been thought to be due to difficulty transferring context specific skills to educationally based tasks. However, researches have stated that mass media and television have

improved the accessibility of knowledge for individuals that did not acquire school related skills and that this has facilitated improved performance on tests of cognition.

1.12 Cognitive Performance Differences between Monolinguals and Bilinguals

Researchers have suggested that tests normed with a monolingual population in one country may not be appropriate with a bilingual population in another country (Figueroa, 1989). For instance, the Spanish translation of the WAIS was normed in Puerto Rico (Green & Martinez, 1967). When this was used to assess elderly Hispanics in the U.S.A. it was discovered that both dialect and cultural issues made generalizations to a Mexican American or Cuban American population problematic (Lopez & Taussig, 1991). In the following sections, studies indicating that test norms from a monolingual population are not appropriate for a bilingual population will be reviewed. In addition, the effects of acculturation, language use and cognitive style differences on test performance will also be examined. Finally, despite limited research in the area, studies comparing cognitive test performance between migrants to individuals from their country of origin will be explored to investigate whether norms from monolinguals are applicable to bilingual migrants.

1.12.1 Acculturation, Language Use and Cognitive Style Differences

Touradji, Manly, Jacobs and Stern (2001) examined within group differences in neuropsychological test performance between U.S.A. born and foreign born English speaking non-Hispanic White elders. All participants were independently diagnosed by a physician as nondemented. After controlling for years of education, participants born in

the U.S.A. obtained significantly higher scores on measures of abstract reasoning, naming, and fluency than foreign born elders. The authors concluded from their findings that although non-Hispanic White individuals are often treated as a homogenous group, performance differences exist even within this group. They argued that the effects of acculturation level and language use on cognitive styles may help explain their findings.

Ardila and Rosselli et al. (2000) investigated the interfering effect of a second language (English) on the first language (Spanish) in native bilingual Spanish speakers living in the U.S.A. They examined syntactic comprehension, verbal memory, and calculation abilities in individuals who had learned English during childhood and had attended English schools. In the first study results for the Spanish Syntactic Comprehension Test were compared with the normative results obtained with 40 Spanish monolingual participants. It was noted that the closer to the English syntax the sentences were, the easier it was for the participants to understand them. Participants who had been exposed to English between the ages of 5 and 12 outperformed participants exposed to English before 5 years of age. Language preference correlated with syntactic comprehension and women outperformed men. In the second study, verbal memory and calculation abilities were examined. Parallel versions of the different tests were administered in Spanish and English. The results indicated some significant differences between the two languages in several verbal learning and calculation ability subtests. Most of the verbal memory subtests were better performed in the first language (Spanish). Scores on tasks measuring speed and calculation accuracy were higher in the participant's native language. The

authors reported that best spoken language was a significant variable in some verbal memory subtests that were performed in English, but not in Spanish.

Biesheuvel and Liddicoat (1959) reported that the South African version of the WAIS was administered to both English speaking and Afrikaans speaking white adults. The English speaking group obtained an average of 6 scale points higher than Afrikaans speakers (nearly half a standard deviation, significant at the 1% level). This was postulated to be due to cultural and environmental differences between the two groups. Nell (2000) reported that subsequent reanalysis of the data, and similar studies comparing white English speaking and Afrikaans speaking groups, continued to indicate that English speakers outperformed Afrikaans speakers. This pattern of performance was most noticeable in participants from age 45 onwards. Researchers argued that this was unlikely to be due to differential aging effects on intelligence, but rather the result of differential cohort experiences as the cultural differences were considered to be greater in the older generation. Based on participants endorsement on a battery of self-report items these performance differences were concluded to be due to stylistic differences in approaches to intellectual tasks and problem solving tasks, such as rigidity versus versatility in thinking and ideational conformity versus ideational independence. Further studies have reportedly documented a progressive decrease in ability score discrepancies with increasing cultural convergence over successive generations of white South Africans (Nell, 2000).

Given findings indicating that normal CALDI can perform within the impaired range according to mainstream norms, a better approach might be to use norms from the country of origin. This assumes that the norms from the country of origin would be valid for the migrant group as both groups share the same language and cultural beliefs. However, researchers argue that migrants who have lived within a different linguistic and host culture for an extended period of time are not culturally and linguistically identical to natives living in their country of origin due to factors such as acculturation (Berry, 1997).

Acculturation is defined as the change in cultural patterns that results from direct and continuous contact of different cultural groups. Change in cultural patterns affects people at the individual and group level, acculturation is a fluid and ongoing process, and levels of acculturation vary widely for individuals and groups. Acculturation relates to testing interpretation issues because it involves the acquisition of language, values, customs, and cognitive styles of the majority culture, all factors that may substantially affect test performance. Level of acculturation is one way in which investigators have operationalised within group cultural variability. Acculturation has been defined as the degree to which culturally different individuals accommodate and integrate new cultural patterns into their original cultural patterns (Samuda et al., 1998). It is also related to the level at which an individual participates in the values, language, and practices of his or her own ethnic community in contrast to those of the dominant culture. Previous studies have identified ideologies, beliefs, expectations, attitudes, media preferences, leisure activities, and observance of holidays as important components of acculturation, as well

as cognitive and behavioural characteristics such as language use and customs (Berry, 1997; Berry, Poortinga, Segall, & Dasen, 2002; Segall, Dasen, Berry, & Poortinga, 1999).

Few studies have compared cognitive test performance between migrants to individuals from their country of origin. One such study conducted by Artiola i Fortuny, Heaton and Hermosillo (1998) compared two samples of normal Spanish speaking participants from the US/Mexico borderland (n = 185) and from Spain (n = 205) on 16 Spanish language neuropsychological measures. Participants' age ranged from 15 to 76 years and participants had between 0 and over 20 years of education. Although in most measures the two samples obtained similar results, and differences between the samples diminished with increasing levels of education, the authors reported some significant main effects of place of birth and some significant interactions between education and place of birth. Within the borderland sample, increased percent of life span spent in the U.S.A. and bilingual status was negatively correlated with performance on a Spanish word generation task, and positively correlated with performance on the Wisconsin Card Sorting Test. Bilingual borderland participants performed significantly better than monolingual speakers in learning a list of words.

Gonzales and Roll (1985) investigated the relationship of Mexican-Americans' degree of acculturation to analytic cognitive style and verbal and nonverbal intelligence. It was reported that when Mexican-Americans become similar to Anglos through acculturation, there was no significant difference in intelligence scores. Varghese (2005) examined the relationship of self-reported acculturation and neuropsychological test performance

among normal Asian Indian immigrants residing in the U.S.A. Results demonstrated that individuals who were highly acculturated to American culture performed significantly better ($p < 0.01$ level) than their low acculturated counterparts on the North American Adult Reading Test Full Scale, Verbal and Performance IQ's, WAIS-III Information and Digit Span subtests, Grooved Pegboard (dominant hand performance), the Boston Naming Test, and the Trail Making Test Part B. Findings indicated that culturally adjusted norms for certain neuropsychological tests were required. In addition, it was argued that findings reflected the need to consider multidimensional assessment models of cultural identification and sociobehavioral characteristics such as test taking factors when assessing CALDI.

Manly and Miller et al. (1998) reported that previous research conducted with immigrant groups suggests that in addition to length of residence, language use is one of the most indicative factors of acculturation level (Gasquoine, 1999). Researchers caution that increased length of residence in new country does not necessarily equate to equal acculturation across other domains (Ponton & Ardila, 1999). For instance, Marin et al. (1987) found that language use, that is Spanish versus English, was the strongest predictor of Hispanic acculturation. Manly and Miller et al. (1998) also reported that among neurologically normal African Americans, traditional African-American practices, beliefs, and experiences were significantly associated with lower scores on neuropsychological measures of verbal ability (WAIS-R Information subtest, and the Boston Naming Test), and Trails B, even after accounting for age, education and sex. Given their results, the investigators purported that there are cultural differences within

CALD groups that relate to neuropsychological test performance, and that accounting for acculturation may improve the diagnostic accuracy of neuropsychological tests. The authors also concluded that lack of previous exposure to stimuli impacted test performance. They hypothesised that acculturation, particularly language use, could serve as a proxy for an educational construct not reflected in the years of education.

Boland (2005) investigated cognitive test performance on the Wechsler Abbreviated Scale of Intelligence (WASI) within 78 healthy Asian-Indian participants, 38 of whom were educated, raised and currently resided in the U.S.A. and 40 of whom were educated, raised and currently resided in India. All the participants completed their education with English as their primary language. Asian-Indian participants from the U.S.A. performed significantly better than their Indian education level counterparts. Differences in performance on testing were related to differences in cultural context (country of residence), differences in acculturation to the U.S.A. culture, and differences in quality of education. The author concluded that some of these variances may stem from inequitable educational systems and unequal exposure to information and stimuli that are used to assess intelligence.

In summary, cross cultural research indicates that test norms from a monolingual population are not appropriate for a bilingual population due to the effects of acculturation, language use and cognitive style differences in approaches to cognitive tasks. Few studies have compared cognitive test performance between migrants to

individuals from their country of origin in order to ascertain whether test norms from a monolingual population are applicable to bilingual migrants.

1.13 Greek Australian Migrants

Australia is one of the most culturally and linguistically diverse societies in the world today. Collectively, Australians speak over 200 languages. About 15% of Australians speak a language other than English. The most common languages other than English are Italian, Greek, Cantonese and Arabic. Collectively, Chinese languages (including Cantonese, Mandarin and other Chinese languages) have the greatest number of speakers after English (Jupp, 2001).

According to the Australian Bureau of Statistics (ABS) (2001a) Census 21.9% of the population was born overseas. Although the majority of those born overseas were from English speaking countries, the third most common language spoken at home other than English was Greek. The current Greek community in Australia is estimated at approximately 600,000 (including second and third generations). The Greek population is concentrated in Melbourne (47 per cent) and Sydney (29 per cent). ABS (2001b) Victorian Census data indicates that of those born overseas Greece is the third main country of birth, and the second most common language spoken at home other than English was Greek. Melbourne has been colloquially referred to as the third largest Greek city in the world (after Athens and Thessaloniki) and is an important overseas centre of Hellenism. In order to understand the challenges faced by GA migrants in acculturating to mainstream Australian culture, difficulty in gaining formal education in Greek and

English, as well as how the GA migrant experience may render these individuals a different cultural subgroup of GN, a review of the cultural factors that lead to migration, and of the characteristic social experience by migrants is outlined in the following section.

1.13.1 History of Migration and Settlement of Greek Australians

Political stability in modern Greece was a fairly recent phenomenon. Prior to 1974 Greece experienced political instability and a ruined economy due to various political struggles. This included the struggle to overthrow the 400-year Ottoman Turkish occupation, the struggle of defending Greece from invaders during the First and Second World Wars, and subsequent civil wars due to conflict between Greek political groups. The system failed to provide work for the growing rural population, and failed to keep up with a modernizing and changing world. The Greek government encouraged emigration as a way of solving the problems of poverty and unemployment. Hence, migration was the end result of a drastic decline in the Greek economy, coupled with an inadequate government system. Between 1947 and 1982 almost 250 000 Greeks arrived in Australia (Dimitreas, 1996).

According to Dimitreas (1996) ethnic population groups that arrived in Australia en masse following the Second World War period, especially through the chain migration processes which characterised the Greeks and the Italians in the 1950s and 1960s, found themselves encapsulated in the so-called “ethnic enclaves” residentially, occupationally, and economically, often until subsequent generations broke away from the social

mobility traps. Many first generation immigrants were concentrated in the unskilled labouring occupations, especially in the manufacturing industry, from which few were able to advance, due to a number of social factors operating against them, including lack of appropriate language skills, non-recognition of skills and qualifications gained overseas, and a lack of readiness by the receiving society to accommodate its newly settled migrants. Fifty years on, these first generation migrants now represent elderly GA that are at a higher risk of being diagnosed with dementia.

1.13.2 Greek Australians Cultural Values and Beliefs

Dimitreas (1996) noted that Greek migration to Australia cannot be fully understood without consideration of non-economic and non-political factors. Although the nation's cultural forces, traditions, and the history of Greek migration itself, together with the continual waging of wars, inhibited economic improvement and encouraged modern Greek migration, a variety of other intrinsic and extrinsic factors forced migration to distant lands. Dimitreas argues that the Greek value system required individuals to make immense psychological and material sacrifices to the demands of the family unit and society. Many people migrated to distant lands such as Australia because of a commitment to their family's values and beliefs. People migrated to acquire funds because of individual and family pride, obligation and/or commitment. Large sums of money have been sent back to Greece by the eldest, usually sons, who migrated to assist towards the purchasing of dowries for sisters, to generally assist the family financially, or to assist the younger siblings attain an education. In fact, education is traditionally regarded as the most important value, after health, in the hierarchy of national values and

aspirations of the Greek culture. In more recent times, education per se, or the failure to qualify for tertiary admission to an institution in Greece, has caused considerable amount of internal and external migration, of either the student or the entire family. Education is particularly important when considering the fact that those involved in farming occupations suffer from a low status profile. This, unfortunately, by some has been regarded as practical proof of innate inferiority. GA with low levels of education can be particularly sensitive about their lack of academic training.

Rosenthal, Bell, Demetriou, and Efklides, (1989) investigated whether Greek immigrants retained traditional Greek values and behaviours or integrated these with Anglo-Australian values and behaviours. The authors reported that their results demonstrated that Greek Australians (GA) retained the collectivistic values of their Greek culture while Anglo-Australians demonstrated a more individualistic orientation. The investigators also noted that there was evidence for convergence of Anglo- Australians and GA perceptions of appropriate behaviours and purported that this supports the view that acculturation is more likely to be manifested in behaviours than in core values.

Acculturation to the dominant culture may arguably be facilitated by exposure to mass media. Given the shared culture of science and technology, contemporary societies have an increased access to knowledge (due to the impact of mass media) and have tended to become more technologically homogenous as communication speed and access to shared information has increased (Ardila, 2005). However, it is likely that the majority of the older GA migrants were not able to benefit from exposure to such advances due to their

limited proficiency in the English language. As until recently, access to mass media in their preferred language, Greek, was generally limited to radio programs broadcast for an hour each day and weekly newspapers, which due to their literacy level, they would have had difficulty reading. In contrast, their contemporaries in Greece have had access to knowledge via mass media, as they have been inundated with information presented in Greek by radio and television stations, and they have had the opportunity to discuss these issues with their neighbours and acquaintances as they could easily communicate within their community.

1.13.3 Greek Australians Socialisation Issues

Many of the GA migrants fled poverty following the world and civil Greek wars, and due to this obtained limited formal education in Greek. In addition, the necessity to work once they arrived in Australia meant that many did not attend an educational institution following migration, leading to low language proficiency in English and low level of literacy in both Greek and English. Given that many GA migrants had low levels of literacy in Greek, learning a foreign language would have consequently been all the more difficult. GA tended to dependent on a relative or a friend, with literacy skills, as a means of accessing and understanding information in English. In addition, as their children obtained a formal education they also relied on them for assistance in order to communicate and understand documentation (personal experience).

Since their migration GA have had varying exposure to English and to Greek culture, being at times isolated from either community, as language was a barrier for participating

in English community activities. Practical issues, such as geographical location, were barriers for interaction by members from similar cultural backgrounds. Due to the minimal cultural and social interaction, some members from this group have retained cultural values that were in place in Greece at the time they migrated. In contrast, their peers in Greece have had continuous cultural and social interactions, which have facilitated the modernization of cultural values. GA have also adopted a language which tends to be a mixture of Greek and English, hence, GA tend to have reduced fluency in both Greek and English. This reduced level of fluency is especially evident in more complex conversation (Dimitreas, 1996).

Dimitreas (1996) noted that the Greek individual requires the social milieu whether it be the local marketplace (agora), local square (plateia), or local coffee shop (kafeneion), to facilitate a free and open exchange of ideas, which is conducive to independent thought and resourceful action. He argues that this environment and the experiences gained from personal involvement in public debate are very enriching in terms of intellectual stimulation of daily life. Dimitreas argued that it is this social environment that allows individuals to initiate cultural development, political discussions, and personal or group interaction. Finding a suitable place for a modern agora, where Greeks can go and meet other people to have debate, whether they are socially committed and concerned, and to “pass a bit of time” as they often say amongst themselves, has been a challenging task for Greek settlers in countries such as Australia.

1.13.4 Language Fluency Post Migration

Artiola i Fortuny (2004) argues that given that language fluency is a skill that requires exposure and constant practice, even individuals with high levels of linguistic skill can, without realizing it, lose a measure of fluency in their native tongue through a natural assimilation process that takes place when one lives and works in a different language and cultural environment. Language shifting in immigrant populations is well documented and manifests itself in characteristic ways. During conversation individuals tend to do a great deal of code switching, or going back and forth between languages. Without the daily reinforcement that comes from a formal and continuous course of language study, or other daily immersion activities, they can no longer readily access components of vocabulary and syntax that are characteristic of fluent speech. When required to speak one language exclusively, they make a number of errors in grammar and syntax. They eventually lose the native intuition that informs them about how to construct their first language smoothly, and, therefore, begin to sound more and more like non-native speakers. Decline in language of origin has been proposed to be linked with a simultaneous loss of up-to-date awareness of sociocultural developments from their country of origin (Artiola i Fortuny, 2004).

At times GA individuals who communicate in both Greek and English appear to be communicating somewhere in between because they tend to blend Greek and English words. In the context of Australia, there is no formal pidgin language identified, however, GA will often change English words to a format similar to Greek. For instance, the English word 'floor' can be adapted to 'flory' which is neither an English or Greek word

but refers to the floor. Similarly fence is often referred to as 'fenci', however the Greek word is 'frakti'. Also the English word 'car' can be adapted to 'caro' which is not an English word. In Greek 'caro' refers to a horse and cart, but is used by GA to indicate an automobile.

In summary, GA constitute one of the largest ethnic groups in Australia. Greeks emigrated in search of work and a better standard of living for their families due to a drastic decline in the Greek economy, coupled with an inadequate government system, following the overthrow of the Ottoman Turkish occupation and the frequent waging of wars. Political stability in Greece has been a relatively recent occurrence (since 1974). Many first generation immigrants were concentrated in the unskilled labouring occupations and sacrificed their traditional Greek way of life for a better standard of living for their families. Many of the GA migrants fled poverty following the world and civil wars, and due to this obtained limited formal education in Greek. In addition, the necessity to work once they arrived in Australia meant that many did not attend an educational institution following migration, hence their low language proficiency in English and low level of literacy in both Greek and English. Furthermore, since their migration GA have had varying exposure to English and to Greek culture, being at times isolated from either community. GA have also adopted a language which tends to be a mixture of Greek and English. Due to the minimal cultural and social interaction, some members from this group have retained cultural values that were in place in Greece at the time they migrated. Whereas their peers in Greece have had continuous cultural and social interactions, hence facilitating the modernization of cultural values.

1.14 Rationale for the Present Study

Neuropsychological tests play an integral role in diagnosing the likelihood of dementia in the elderly. A significant number of Australia's elderly are likely to suffer from dementia. It is estimated that in Australia, about 5% of people over the age of 65 years and 20% of people over the age of 80 years are affected by some form of dementia (Department of Health and Ageing, 2002; Eastwood et al. 1996; Jorm, Korten & Henderson, 1987). In Australia there were over 162,000 people with dementia in 2002, and as Australia's population ages the number of people with this disease will increase. It is estimated that by the year 2040, half a million Australians will be affected (Alzheimer's Australia, 2003). The accurate diagnosis of dementia and other cognitive disorders is likely to become an increasingly important issue for neuropsychologists and health services in general (LoGiudice, Hassett, Cook, Flicker, & Ames, 2001).

The first generation of migrants is getting older and is at an age where it is most at risk of cognitive illnesses such as dementia. A significant number of elderly who are at risk of suffering from a cognitive disorder do not speak English fluently. According to the 1996 census, 287,662 of the Australian elderly (65 years and over) spoke a language other than English. Among these, 40%, or 116,791 persons reported that they did not speak English fluently (Australian Bureau of Statistics, 1999). These statistics would indicate that there are a large number of potential patients which may require assessment for dementia and that language fluency may be an issue. GA constitute one of the largest ethnic minority groups within Australia (ABS, 2001a). By 2011, the CALD older population living in Melbourne is projected to reach 194,200, a 73% increase from 1996 (112,300). Among

all the capital cities, Melbourne is projected to have the largest proportion of its older population from CALD backgrounds. By 2011, 38% of this older population will be from CALD backgrounds, up from 29% in 1996. The overseas-born population in Melbourne is less diverse than other capital cities, such as Sydney. Italy and Greece are the two most common countries of birth. It is estimated that a substantial increase of older CALDI in Melbourne will be among those born in Greece rising by 21,400 (ABS, 2000).

The diagnostic accuracy of neuropsychological tests on Western English speaking countries such as U.S.A., Britain and Australia has been well documented. However, an increasing number of researchers have reported diagnostic inaccuracies when these tests, and western norms, are systematically applied to CALD groups (Artiola i Fortuny, 2004). Tests which are developed and normed for English speaking groups lose a great proportion of their precision when applied to CALD elderly (Hinkle, 1994; cited in Ridley & Li, 1998). Cross cultural researchers have argued that although cognitive processes are likely to be universal, one's experience, or cultural and linguistic background, influences the type of cognitive abilities and the degree of development of these cognitive abilities (Ardila, 1995; Anastasi, 1988; Berry, 1993; Ardila, Rosselli & Puente, 1994). Culture prescribes what should be learned and at what age. Consequently, different cultural environments lead to the development of different patterns of abilities (Ardila, 1995). Hence, education and literacy level are associated with particular cognitive styles and certain learned abilities which Western cognitive tests were developed to assess (Suzuki, Ponterotto & Meller, 2001; Samuda et al., 1998).

In order to improve the psychometric properties of cognitive tests Greek National (GN) researchers standardized and validated a number of western tests in Greece, including the Cambridge Cognitive Examination of the Elderly (CAMCOG), (Tsolaki, Fountoulakis, Chantzi & Kazis, 2000) the Mini Mental Status Examination (MMSE) (Fountoulakis, Tsolaki, Chantzi & Kazis, 2000), and the short form of the Geriatric Depression Scale (GDS), (Fountoulakis, Tsolaki, Iacovides, Yesavage, O'Hara, Kazis & Ierodiakonou, 1999). These tests are internationally used by a variety of professionals in the diagnosis and screening of dementia and assessment of depression in the elderly.

The CAMCOG is the cognitive section of the Cambridge Cognitive Examination for the Elderly (CAMDEX), which was developed by Roth, Tym, Mountjoy, Huppert, Hendrie, Verma, and Goddard (1986). The CAMDEX has been reported as being a comprehensive and reliable instrument of dementia diagnosis with high inter-rater reliability and with statistical significance. It includes eight sections which cover demographic details, the individuals present physical and mental state, in particular organic psychoses, depression and functional paranoid psychoses. Enquiries regarding past history and family history are made. The CAMCOG includes the MMSE items and additional items covering remote and recent memory and the recall and recognition of new information. Further sections consist of the interviewer's observations on the subject's appearance, behaviour, mood, speech, mental slowing, activity, insight, thought processes and level of consciousness, and any bizarre behaviour. A record is also made of any medication currently being taken and the duration it has been taken. There is also a structured interview, in the absence of the subject, with a relative or a carer who knows the subject

well. Lastly, there is a section comprising of a physical examination including an allocated division for the results of laboratory and radiological investigations, if deemed necessary (Roth, Tym, Mountjoy, Huppert, Hendrie, Verma, & Goddard, 1986). Greek researchers standardized and validated the CAMCOG in Greece and reported that their sample obtained different cut-off scores from the British cut-off scores. The authors concluded that these differences were likely due to cultural and educational differences between the groups (Tsolaki, Fountoulakis, Chantzi & Kazis, 2000).

The MMSE, designed by Folstein, Folstein and McHugh (1975) is the most widely used and studied screening measure of cognitive impairment. It has the advantage of conciseness and ease of administration. It comprises 11 items designed to assess orientation, registration, attention, calculation, and language. It has excellent inter-rater and test-retest reliabilities, and it provides a good screening test for dementia (Groth-Marnat, 1999). Although the MMSE is not a formal psychometric instrument, it has been used in psychiatry, clinical psychology, and social work for more than 30 years. The MMSE is used to obtain information about the client's level of functioning and presentation. It is generally conducted, formally or informally, during the initial or intake interview. The MMSE can also provide clinicians with a helpful format for organising objective and subjective information to use in diagnosis (Polanski & Hinkle, 2000). Fountoulakis, Tsolaki, Chantzi and Kazis (2000) investigated the utility of the MMSE in Greece. However, unlike the CAMCOG findings, the investigators reported that their sample obtained comparable cut-off scores as reported by other studies.

The Geriatric Depression Scale (GDS) is a screening instrument used to measure depression in the elderly. The GDS was developed specifically for elderly subjects; it deliberately omits items which the authors considered inappropriate, such as items dealing with guilt, sexuality and suicide. The GDS has been reported to have good retest reliability and internal consistency (Brink, Yesavage, Lum, Heersema, Adey, and Rose, 1982; Spren & Strauss, 1998). Fountoulakis, Tsolaki, Iacovides, Yesavage, O'Hara, Kazis and Ierodiakonou (1999) also investigated the utility of the GDS 15 item form in Greece. The authors reported that similar to the MMSE study findings that their group obtained comparable cut-off scores as reported by other studies. Additional information about these tests is provided within the Materials section.

Cross cultural researchers have argued that some of the most important variables that play a role in the measurement of human brain function are cultural and educational in nature (Ardila, Rosselli, & Puente, 1994; Ardila, 1995) and as such caution against the practice of using Western norms on CALDI as they do not account for CALD backgrounds and experiences (Suzuki & Kugler, 1995; cited in Ridley & Li, 1998). Given the cultural and linguistic characteristics of the GA elderly migrants, for instance generally low levels of literacy and poor English proficiency, as compared to English speaking Australians, it is anticipated that the use of mainstream English neuropsychological tests and norms to evaluate dementia would be inappropriate due to the risk of inaccurate diagnosis. Currently not much is known about differences in cognitive test performance between GA and English speaking Australians. However, given that GN obtained lower CAMCOG cut-off scores than the British sample (Tsolaki, Fountoulakis, Chantzi &

Kazis, 2000) it is likely that GA would also obtain lower scores than English speaking groups.

Few studies have compared cognitive test performance between migrants to individuals from their country of origin. However, one such study comparing two samples of normal Spanish speaking participants from US/Mexico borderland and from Spain on Spanish neuropsychological measures indicated that although in most measures the two groups obtained similar results, increased percent of life span spent in the US and bilingual status was negatively correlated with performance on a Spanish word generation task, and positively correlated with performance on the Wisconsin Card Sorting Test (Artiola i Fortuny, 2004; Artiola i Fortuny, Heaton & Hermsillo 1998). In addition, degree of acculturation has also been reported to be linked with cognitive test performance differences (Gonzales & Roll, 1985).

There is a clear gap in the literature regarding the performance of GA as compared to GN on tests of cognition. Although GA and GN have similar cultural values and beliefs, given the ecological context hypothesis (Ardila, Rosselli & Puente, 1994) it is likely that there are cultural and linguistic differences between GA and GN. This is probably due to different socialization experiences, different exposure to Greek, differences in GA ability to maintain linguistic skills, and due to acculturation factors from exposure to the Australian culture. To date no studies have compared cognitive test performance between GA and GN, however, the availability of GN normative data on tests of cognitive

functioning provides an opportunity to investigate whether GA migrants would perform similarly to GN peers.

1.15 Aims of Current Study

Given the current gap in scientific knowledge regarding GA performance on tests of cognition and knowledge gap regarding cognitive performance differences between GA and GN the present study has the following aims:

- To investigate the performance of healthy community dwelling GA on two tests of dementia assessment, and cognitive functioning, and on a test of depressive symptomatology
- To investigate whether the cognitive test performance on tests of dementia of the long-term migrant group of GA was comparable to a demographically similar group of Greek Nationals (GN)
- To investigate whether test norms available for GN elderly on tests of dementia were appropriate for use with GA
- To test the utility of these instruments and to establish a baseline for future research of dementia assessment and cognitive functioning in GA elderly

1.16 Hypothesis

It is expected that consistent with findings of studies investigating within group differences in neuropsychological test performance from the U.S.A., Spain and India (Touradji, Manly, Jacobs & Stern, 2001; Artiola i Fortuny, Heaton & Hermosillo, 1998; Boland, 2005), it was hypothesised that GA would obtain lower scores on tests of cognition, as measured by CAMCOG and MMSE, compared to GN.

CHAPTER 2

Method

CHAPTER 2: METHOD

2.1 Participants

There were two main sources of study participants: the first group was recruited in Australia, and the second group was recruited in Greece. Australian participants (referred to as Greek Australians; GA) were healthy elderly Greek immigrants living independently in the Australian community who were recruited from elderly Greek Australian social clubs within the Melbourne metropolitan area, as well as from acquaintances of the investigator, and were assessed at their homes. Archival data of participants recruited in Greece (referred to as Greek Nationals; GN) was obtained and analysed with the permission and generous support of Greek National researchers, from separate studies (Tsolaki, Fountoulakis, Chantzi, & Kazis, 2000; Fountoulakis, Tsolaki, Chantzi & Kazis, 2000) who validated the Cambridge Cognitive Examination (CAMCOG) and the Mini Mental Status Examination (MMSE) in outpatients diagnosed with dementia, and in non-demented Greek elderly.

2.1.1 Greek Australian Participants Recruitment and Exclusion Criteria

An invitation to participate was offered to all GA attending each of the Melbourne metropolitan social clubs that were approached. A group announcement about the study was made by the examiner and then participants were provided with further information individually. GA participants were required to be linguistically and physically capable of managing with the demands of the test.

Participants were required to be able to:

- a. follow a verbal conversation in Greek
- b. move their upper limbs
- c. have adequate visual acuity to complete the test items

GA participants with a history of neurological, vascular, or psychiatric conditions (such as epilepsy, Parkinson's disease, dementia, and diabetes, stroke, head injury or a mental illness) were excluded from involvement in the study. Of the 94 participants recruited, 28 were subsequently excluded from analysis when it became evident that they met the exclusion criteria, or they were unable to complete the assessment for reasons including distraction, non-optimal testing conditions, or participant discomfort.

2.1.2 Greek National Participants Recruitment and Exclusion Criteria

Greek National participants were recruited by Greek researchers from the 3rd Department of Neurology, Aristotle University Hospital of Thessaloniki. Participants were either outpatients or relatives of outpatients with dementia. Participants' regional and social-economic background was varied and included villages close to Greece's second largest city, Thessaloniki, as well as former rural areas which had been incorporated within Thessaloniki city limits, and from the center of Thessaloniki (Tsolaki et al., 2000).

Greek National participants were categorised according to the following criteria:

- a. Greek national participants without dementia, referred to as Greek Normals (Gn)
- b. Greek national participants with a variety of clinical diagnoses and cognitive symptomatology (GID)
- c. Greek national participants with dementia (GD)

Of the 250 Greek National cases, 11 cases were excluded due to missing data. The remaining 239 cases were divided as follows: Gn ($n = 76$), GID ($n = 66$), and GD ($n = 97$). The GID group consisted of the following diagnoses: age associated memory impairment ($n = 31$), vascular conditions ($n = 17$), depression ($n = 15$), myasthenia gravis ($n = 1$), chronic schizophrenia ($n = 1$), and personality disorder ($n = 1$). The GD group included 30 patients with Alzheimer's disease, 29 patients with vascular dementia, and 37 patients with other types of dementia (dementia secondary to other causes, non-defined dementia, and mixed dementia). The GID group was included in the original study in order to represent the sort of population that may be seen in a memory clinic or in the second phase of a community study (Tsolaki et al., 2000).

All subjects who took part were physically able to cope with the demands of the test. For example, they did not suffer from paralysis in the upper extremities so as not to be able to write, and were not blind. Illiterate participants, or participants with delirium, were excluded from the study (Tsolaki et al., 2000).

2.1.3 Demographic Details of Greek Australian Participants

The remaining 66 GA participants were aged between 56 and 88 years (group mean age = 66.2 years, $SD = 6.3$). There were 41 females (mean age = 66.0, $SD = 6.5$), and 25 males (mean age = 66.5, $SD = 6.0$). The majority of both female and male participants were between 60 to 70 years of age. Although there were slightly more females (62%) than males in our sample, this is in keeping with population characteristics, with slightly more

females (57%) than males in the 65 years and over age category (Australian Bureau of Statistics, 2001a).

The mean years of education for the GA group was 6.5 ($SD = 3.4$). Females had a mean education of 5.8 years ($SD = 3.2$), and males mean years of education was 7.7 ($SD = 3.5$). Although one female participant did not receive any formal education, and another female participant reported that she attended primary school but did not complete a grade, these participants were included in the analysis as their lack of education is characteristic of the experience of many GA's of that time. Participants' qualitative reports indicated that their education was disrupted by war, and by poverty following the war. In addition, many participants indicated that they were unable to return to study and had to seek employment at an early age. GA participant demographic details are presented in Table 2.1.

Table 2.1 Greek Australian Participants Demographic Details

Greek Australians				
	<i>M</i>	<i>SD</i>	Range	<i>N</i>
Age				
Overall Group Age	66.2	6.3	56-88	66
Females	66.0	6.5	56-80	41
Males	66.5	6.0	61-88	25
Education				
Overall Group Years of Education	6.5	3.4	0-15	66
Females	5.8	3.2	0-15	41
Males	7.7	3.5	2-14	25

One way analyses of variance (ANOVA) were conducted to investigate whether there were any differences between GA female and male participants in age and years of education. There was no significant difference between female and males in age, $p > .05$, however, males were significantly more educated than females, $F(1, 64) = 4.897$, $p < .05$.

GA's responses on the GDS short 15 item form indicated minimal depressive symptomatology present. The overall group mean was 3.11 ($SD = 2.74$). An ANOVA

indicated that there was no significant difference between female and male scores on the GDS, $p > .05$.

The majority of participants (96%) were born in Greece. Of the remaining 4%, two participants were born in Cyprus and one participant was born in Egypt. However, all participants spoke Greek. Participants' years of residence in Australia ranged from 23 years to 47 years (mean number of years = 38.7, $SD = 4.7$). Participants were asked to rate their proficiency with the Greek and English language as either poor, moderate, or good. The majority of participants (91%) rated their proficiency with the Greek language as good, and 9% rated their proficiency with Greek as moderate. In contrast, only 9% of participants rated their proficiency with English as good, 53% of the participants rated their proficiency with the English language as moderate, and 38% of the participants rated their proficiency as poor.

The majority of participants (83%) were married, and 17% were widowed. In addition, the majority of participants were not employed (83%), while 14% were employed on a part time or casual basis, and 3% were employed on a full time basis. Table 2 outlines employment status by gender. As can be seen in Table 2.2, approximately 47% of the males, compared to approximately only 8% of females were employed on a part time or casual basis.

Table 2.2 Distribution of Employment Status in Relation to Gender

		Employment Status by Gender		
		Not Employed	Full Time	Part Time/Casual
Gender	Female	38	1	2
	Male	17	1	7
Total		55	2	9

$N = 66$

2.1.4 Demographic Details of Greek National Participants

Age and years of education, for each of the Greek National groups, are presented in Table 2.3.

Table 2.3 Greek National Participants Demographic Details

	Greek National Normals Group (Gn)				Greek National Independent Diagnosis Group (GID)				Greek National Demented Group (GD)			
	<i>M</i>	<i>SD</i>	Range	<i>N</i>	<i>M</i>	<i>SD</i>	Range	<i>N</i>	<i>M</i>	<i>SD</i>	Range	<i>N</i>
Age												
Overall Group Age	69.8	7.5	55-93	76	69.3	7.7	58-86	66	70.1	7.6	55-86	96
Females	68.3	6.2	56-81	34	67.3	6.6	58-81	27	70.1	7.6	56-86	47
Males	71.0	8.2	55-93	42	70.7	8.1	60-86	39	70.1	7.7	55-86	49
Education												
Overall Group												
Years of Education	6.0	3.0	2-18	76	5.3	1.9	2-12	66	5.1	2.4	1-16	96
Females	5.0	1.6	2-8	34	5.1	2.0	2-12	27	4.5	2.2	1-12	47
Males	6.8	3.6	2-18	39	5.4	1.8	2-10	39	5.7	2.4	2-16	49

A series of one way ANOVA's were conducted to investigate whether there were any gender differences in age, and years of education for each participant group. Gn males were significantly more educated than Gn females, $F(1, 74) = 7.432, p < .01$, and GD males were significantly more educated than the GD female participants, $F(1, 94) = 6.571, p < .05$. There were no significant differences between Gn, or GID, or GD, males and females in age, or between GID males and females in education (all p 's $> .05$).

2.1.5 Comparison between Groups on Demographic Details

A two-way ANOVA with age as the dependent variable and gender and groups (GA, Gn, GID, and GD) as the between subjects factors showed a statistically significant difference between participant groups in age, $F(3, 296) = 3.826, p = .01$. Post-hoc comparisons using the Tukey HSD test indicated that the mean age for the GA group was significantly lower from the mean age of the Gn group (mean difference = -3.60, $p < .05$). GA's mean group age was also significantly lower than the GD mean group age (mean difference = -3.90, $p = .01$). The GA group did not significantly differ in age with any of the other groups. There were no significant differences in age between males and females for the four groups ($p > .05$).

A two-way ANOVA was also conducted with years of education as the dependent variable and gender and groups (GA, Gn, GID, GD) as the between subjects factors. This showed a statistically significant difference between groups in years of education, $F(3, 296) = 5.985, p = .001$. Post-hoc comparisons using the Tamhane test indicated that GA's group mean years of education was significantly higher than the GD group mean years of

education (mean difference = 1.46, $p < .05$). There were no other significant differences between groups in years of education (all p 's $> .05$).

There was also a statistically significant difference between males and females for years of education, $F(1, 296) = 17.369$, $p < .001$. Males were significantly more educated, ($M = 6.25$, $SD = 2.95$), than females ($M = 5.08$, $SD = 2.40$). However, there was no significant interaction between gender and participant groups on years of education, ($p > .05$).

2.2 Materials

The materials included in the current study were chosen in order to allow direct comparison between the cognitive test performance of GA participants and GN participants. A copy of the materials used as part of the current study has been included refer to Appendix A.

2.2.1 *The Cambridge Mental Disorders of the Elderly Examination (CAMDEX)*

The CAMDEX schedule was developed by Roth et al. in 1986, for older individuals (over 65 years of age), to aid in the diagnosis and measurement of dementia. It is a comprehensive instrument and includes a structured psychiatric interview investigating present mental state, past medical history and family history. It also includes an evaluation of a broad range of cognitive functions, a standardized schedule for recording observations of present mental state, appearance and demeanor, as well as, a structured interview with a relative or other informant, a brief physical examination, and where

applicable a record of a range of laboratory findings, and medications. CAMDEX has been described as having methodological advantages over other screening methods and is purported to produce low levels of false positive diagnoses (O'Connor, 1990).

The eight sections of the CAMDEX schedule are as follows. Section A consists of a structured clinical interview aimed at assessing current physical and mental state, and in particular includes items relating to symptoms of organic psychoses, depression, and functional paranoid psychoses. The interview also includes questions relating to past medical history, and questions relating to family history of medical conditions. Section B of the CAMDEX consists of the Cambridge Cognitive Examination and is referred to as CAMCOG, this will be discussed in more detail in a later section. Section C is completed at the end of the interview as it consists the examiner's observations of the participant's appearance, behaviour, mood, speech, mental slowing, activity, insight, thought processes, level of consciousness, and any bizarre behaviour. Section D comprises of a physical examination. Where applicable, in Section E the results of laboratory and radiological investigations are recorded, in Section F current medications are recorded, and in Section G additional information obtained in the course of the interview is also recorded. The final section, Section H comprises the structured interview with a relative or informant, with questions regarding any personality change, difficulty in functioning in everyday situations, indications of cognitive difficulties, as well as questions relating to the presence of depressive or paranoid phenomenology. In addition, past medical history and family medical history is also evaluated. In addition to assessment of cognitive function, CAMDEX also includes the Organicity diagnostic scale, Multi-infarct dementia

(MID) diagnostic scale, and the Depression Diagnostic Scale. As sections that pertain to these scales were not included in the current study, the scales were not utilized and therefore will not be discussed further in the present paper.

Following the completion of the CAMDEX a psychiatric diagnosis may be made based on all relevant and available information, and according to operational diagnostic criteria. Roth et al. (1986) reported that diagnoses are assigned to one of 11 categories: normal, senile dementia of the Alzheimer type, multi-infarct dementia, mixed senile dementia of the Alzheimer type, and mixed multi-infarct dementia, dementia secondary to other causes, clouded state/delirium, clouded state/delirium with dementia, depression, anxiety or phobic disorder, paranoid illness (such as paranoid schizophrenia), and other psychiatric disorder. The severity of dementia and the severity of depression can be graded on a five point scale.

2.2.1.1 Cambridge Cognitive Examination (CAMCOG)

The CAMCOG has been described as a brief neuropsychological battery designed to assess the range of cognitive functions required for a diagnosis of dementia, and to detect mild degrees of cognitive impairment in order to assist in the diagnosis of dementia in an early stage (Huppert, Brayne, Gill, Paykel, & Beardsall, 1995). Since its development the CAMCOG has been widely used in clinical and epidemiological studies around the world. Recent publications have come from Europe (Neri, Roth, Mountjoy, & Andermarcher, 1994; Neri, Rubichi, DeVreese, Roth, & Cipolli, 1998; Schmand, Walstra, Lindeboom, Teunisse, & Jonker, 2000; Verhey et al., 2003); the UK (Ballard et

al., 2001; Hon, Huppert, Holland, & Watson, 1999; Huppert, Brayne, Gill, Paykel, & Beardsall, 1995; Huppert et al., 1996; Leeds, Meara, Woods, & Hobson, 2001) the US (Hendrie et al., 1988), Australia (Clarnette, Almeida, Forstil, Paton, & Martins, 2001; LoGiudice, Hassett, Cook, Flicker, & Ames, 2001) and Israel (Heinik, Werner, Mendel, Raikher, & Bleich, 1999). Several studies have found that CAMCOG is sensitive to early stages of dementia (e.g. Huppert et al., 1996; Fountoulakis, Tsolaki, & Kazis, 2001), and can predict which individuals will develop dementia (Brayne, Best, Muir, Richards, & Gill, 1997; Nielsen, Lolk, Andersen, Andersen, & Kragh-Sorensen, 1999; Schmand et al., 2000). CAMCOG has also been found to be effective in screening for dementia in Parkinson's Disease (Hobson & Meara, 1999), and post-stroke (de Koning, Dippel, van Kooten, & Koudstaal, 2000), and in differentiating dementia from depression (Heinik et al., 1999) and differentiating dementia with Lewy Bodies from Alzheimer's disease (Ballard et al., 1999).

The items contained in the CAMCOG were selected to sample the areas of cognitive functioning which are specified in the Diagnostic and Statistical Manual of Mental Disorders (DSM) operational criteria of dementia. These include memory, language, attention, perception, praxis and abstract thinking. In addition, the CAMCOG was designed to include both the MMSE and the Abbreviated Mental Test (AMT) of Hodkinson (1972) that was derived from the original Dementia Scale of Blessed, Tomlinson, and Roth (1968), and also contains items which assess orientation and calculation (Roth et al. 1986).

2.2.1.2 Psychometric Properties of the CAMCOG

The relationship between cognitive performance and severity of dementia was examined by correlating both the dementia score, from the original Dementia Scale of Blessed, Tomlinson and Roth (1968) and the clinical rating of severity of dementia with scores on the CAMCOG. Roth et al. (1986) reported that the dementia score correlated -0.70 with the CAMCOG, and that it also correlated significantly with the subscales of the CAMCOG. The clinical rating of severity of dementia also correlated highly with the cognitive subscales ($p < .001$ for all comparisons). Within the demented group as a whole ($n = 49$) there was very good agreement between cognitive performance and the clinician's estimate of severity of dementia. The correlation was -0.83 for the total CAMCOG score. The researchers also stated that the correlation was highly significant for each of the eight cognitive subscales, the highest correlation being obtained for language (-0.77) and the lowest for attention (-0.40 , $p < .01$).

Roth et al. in 1986 reported that the majority of the CAMCOG items reached an acceptably high inter-rater reliability. The naming of as many different animals as possible in a minute item had the lowest reliability in the CAMCOG ($\phi 0.30$). This was found to be due because one of the raters had excluded fish or birds. Scoring instructions were then made more explicit to increase the reliability of the item. The inter-rater reliability of the CAMDEX sections were reported as follows: Section A (interview with patient) $r = .99$, Section B (CAMCOG) $r = .97$, Section C (observations) $r = .81$, and Section H (interview with informant) $r = .90$. Roth, Tym, Mountjoy, Huppert, Hendrie,

and Verma, et al. (1986) reported that the cut-off score of 79/80 discriminated between demented and normal subjects, with 92% sensitivity and 96% specificity.

Huppert, Jorm, Brayne, Girling, Barkley, Beardsall, et al., (1996) conducted a population survey, in two stages, of people over the age of 75 years with the CAMCOG and reported that the total CAMCOG score had an excellent internal reliability, of .82 and .89, and test-retest reliability of .86. The reliability of the individual subscales which corresponded to different cognitive abilities varied. The Memory subscale had the highest test-retest reliability of .80, and the lowest was for Comprehension with test-retest reliability of .46. The authors reported that the subscales test-retest reliability were generally satisfactory. Principle component analysis on the individual CAMCOG items revealed two easily interpretable factors corresponding to general intelligence and memory. The general intelligence factor included items related to both crystallized and fluid intelligence such as acquired factual knowledge items, abstract thinking items, information processing items and praxis items. The items rating most highly on the second rotated factor were all of the recent memory items of the CAMCOG, recall of newly learned information and orientation. This second factor was described as a recent memory and learning factor, as none of the remote memory items were included. CAMCOG scores were reportedly effective in discriminating between non-demented and demented individuals, as well as detecting cognitive impairment at an early stage of dementia. The investigators reported that the total CAMCOG score, as well as the score on each individual subscale (including the subdivisions of the Memory and Language subscales) differed significantly between the non-demented group and each of the minimal dementia and mild dementia groups.

Minimal dementia subjects were defined as individuals that did not reach DSM-IV criteria for a diagnosis of dementia, but for whom there was evidence from the clinical examination and the informant interview of cognitive decline, which was considered to reflect a possible preclinical stage of dementia. CAMCOG total scores showed high levels of sensitivity and specificity in differentiating between non-demented individuals and those with a diagnosis of mild dementia. Huppert, Jorm, Brayne, Girling, Barkley, Beardsall, et al., (1996) reported that the cut-off point which produced the highest levels of both sensitivity and specificity (for people over the age of 75 years) was 80/81, with values of 93% and 87% respectively.

Huppert et al., (1995) reported data on the distributional properties of CAMCOG scores in a sample of 418 elderly (aged 77 and above) living in the community, and the relationship between CAMCOG scores and major socio-demographic variables. The authors reported that CAMCOG scores were moderately normally distributed with a positive skew, but with no evidence of a ceiling effect. The investigators also reported that age, gender, education, and social class were each shown to have a significant and independent effect on CAMCOG total score and many of the CAMCOG subscales. Mean CAMCOG scores decreased with increasing age, were lower for women than for men, increased with increasing education (age left school), and were higher in the higher social class groups. Of the eight major subscales (orientation, language, memory, attention, praxis, calculation, abstract thinking, and perception), age was significantly related to all but attention; gender was significantly related to attention, praxis, calculation and perception; education was significantly related to language and abstract

thinking; and social class was significantly related to language and perception. Given that Brayne, Gill, Paykel, and Huppert (1995) had found that men tend to perform better on serial sevens and women tend to perform better on spelling WORLD backwards, Huppert et al., (1995) reported that one reason for finding a sex difference in their study may have been because they restricted the attention item to serial sevens rather than taking the best of serial sevens and spelling WORLD backwards. Huppert et al., (1995) noted that education and social class highly correlated with each other and when the impact of education was examined without adjusting for social class, attention and praxis were also found to be significantly related to education.

Given these findings the authors recommended caution when applying a non-adjusted cut-off score on CAMCOG performance. Huppert et al. (1995) argued that the premorbid performance of certain groups of individuals (e.g. semi-skilled or unskilled manual workers with little education) may be below the cut off score, resulting in false positives on a screening test. In addition, the authors also noted that the literature has documented marked age-related cognitive decline in cognitive test performance, and this has been reported in both cross-sectional studies as well as in longitudinal studies (Brayne, Gill, Paykel, & Huppert, 1995; Huppert et al., 1995). In order to overcome these limitations Williams, Huppert, Matthews, and Nickson (2003) developed age, gender and education adjusted norms for the British elderly population.

2.2.1.3 Psychometric Properties of the Greek CAMCOG

Tsolaki, Fountoulakis, Chantzi, and Kazis (2000) standardized and validated the CAMCOG in Greece. The CAMCOG was translated into Greek, and was back translated to English. The investigators reported that although most of the items were easily translated to Greek and were transculturally stable, some of the items were adjusted so that they were appropriate for the Greek geriatric population. Tsolaki et al. recruited 100 participants with dementia, and 150 participants without dementia. The CAMCOG was administered by a trained physician who was blind to the diagnosis, and did not participate in the diagnostic procedure. Tsolaki et al. (2000) reported that the CAMCOG was reliable with Cronbach's $\alpha = 0.93$ and that the subscales had a satisfactory inner cohesion with α values from 0.50 for perception to 0.88 for orientation. The CAMCOG was found to be reliable during test-retest $r = 0.77$, the CAMCOG subscales varied from 0.32 for memory learning to 0.81 for language comprehension and language expression, and was also found to correlate highly with the Greek version of the MMSE ($r = 0.80$). The authors also reported a high correlation between CAMCOG and MMSE scores $r = 0.81$. As participant's age ranged from 55 to 93 years of age, the authors separated their participants into two groups, less than 74 years of age and greater than 75 years of age. Age and level of education were not significantly different between the two diagnostic groups, and there was no statistically significant difference between the two age groups on level of education. However, there was a significant difference between participants with, and participants without dementia, performance on CAMCOG, and performance on the following subscales; language expression, praxis and perception.

In the group of participants less than 74 years of age Tsolaki et al. reported that a score of 73/74 was determined as the best cut-off point for detecting dementia, with a sensitivity of 87.14 and specificity of 84.68. In the group of participants greater than 75 years of age the score of 64/65 was selected as the best cut-off point for detecting dementia, with a sensitivity of 80.00 and specificity of 87.14. The authors stated that the sensitivity and specificity of the cut-off scores were not satisfactory at those levels but were considered the best levels given borderline participants that fell within the “uncertainty zone.” The investigators attributed these unclassified cases, or borderline participants, as occurring due to the inclusion of many marginal cases into the non-demented group (that is, age-associated memory impairment patients and vascular patients). In addition, unlike the original study by Roth et al., (1986) the Greek investigators did not include patients with delirium in their demented group. However, the investigators concluded that the main reasons for the difference between the Greek cut-off scores and the British cut-off scores were likely due to differences in education and social background.

2.2.1.4 CAMCOG Subscales

The CAMCOG consists of the following eight subscales: orientation, language, memory, praxis, attention, abstract thinking, perception and calculation. Huppert, Jorm, Brayne, Girling, Barkley, Beardsall, et al., (1996) reported that within each domain of cognitive function items vary in difficulty so that the full ability range can be assessed and floor and ceiling effects minimized. Furthermore, within some of the broad areas of cognitive functioning, there are further subdivisions. For example, the memory subscale includes

items covering remote as well as recent memory, semantic and episodic memory, and the recall and recognition of new information learned incidentally as well as intentionally.

The orientation items comprise the 10 items from the MMSE. The authors also noted that the CAMCOG incorporates items which are commonly used in neuropsychological assessment to examine dissociable functions. For example, there are measures of language comprehension and language expression. Language comprehension is assessed using both nonverbal and verbal responses in spoken, and written form, and expression is assessed by tests of fluency, naming, repetition and definitions. Memory items cover remote memory (famous events and people), recent memory (news items, prime minister) and the recall and recognition of new verbal and pictorial information learned incidentally as well as intentionally. Praxis is assessed by copying, drawing and writing as well as carrying out instructions, for example wave good bye, and pretend to cut with scissors. Attention is assessed by serial sevens (from the MMSE) and counting backwards from 20 (from the AMT). Abstract thinking comprises four similarities items, perception is assessed by visual identification of photographs of famous people and of familiar objects from unusual angles as well as by tactile recognition of coins, and calculation is assessed by an addition and subtraction question involving money (Huppert, Jorm, Brayne, Girling, Barkley, & Beardsall, et al., 1996).

Scores can be obtained for each of the eight broad areas of cognitive function, or scores can be combined to give a total CAMCOG score with a maximum of 107 points (Huppert, Brayne, Gill, Paykel, & Beardsall, 1995). The number of items and maximum

score for each subscale are shown in Table 2.4. As CAMCOG was originally designed from a diagnostic perspective rather than from a psychometric approach, the range of scores on these subscales varies considerably. For instance, language and memory have a large range (a maximum of 30 and 27 respectively) while calculation has a very small range (0 to 2) which makes it less sensitive to cross-sectional or longitudinal variation (Huppert et al., 1995). Huppert, Jorm, Brayne, Girling, Barkley, Beardsall, et al., (1996) previously combined the attention and concentration subscales, as they are short subscales, both involving arithmetic items. Similarly, the attention and concentration subscales were also combined for the purposes of the current study.

Table 2.4 Composition of CAMCOG Subscales

Composition of CAMCOG Subscales		
Subscales	Number of Items	Maximum Score
Orientation	10	10
Language	17	30
Comprehension	9	9
Expression	8	21
Memory	13	27
Remote Memory	6	6
Recent Memory	4	4
Learning	3	17
Attention/Calculation	4	9
Praxis	8	12
Abstract Thinking	4	8
Perception	4	11
CAMCOG total	60	107

The CAMCOG total score consists of 60 items and takes approximately 30 minutes to administer. Not all of the cognitive items administered during testing are included in calculating the CAMCOG total score. For instance, although all the MMSE items are included in the cognitive examination, several MMSE items were omitted from calculating the total CAMCOG score as these functions were assessed in more detail by other CAMCOG items. The following items are not included in calculating the CAMCOG score: naming two objects, registration and recall of three words, writing a sentence, and paper folding. In addition, the cookie theft picture from the Boston Diagnostic Aphasia Battery is an optional item, and does not contribute to the total CAMCOG score.

2.2.1.5 CAMCOG Item Modifications

Although most of the CAMCOG items were readily translated into Greek, some changes were made for administration to Greek nationals and these are listed below in Table 2.5.

Table 2.5 Greek Nationals CAMCOG Item Changes

Item Number	Original Item	Item Changed To
Item 144	no ifs ands or buts	ΤΗΣ ΠΟΛΗΣ, ΤΗΣ ΠΑΛΗΣ, ΤΗΣ ΟΛΗΣ, loosely translates to the town's, the fight's, the all
Item 148	Can you tell me when the First World War began?	Can you tell me when was Thessaloniki freed?

Item Number	Original Item	Item Changed To
Item 149	Can you tell me when the Second World War began?	Can you tell me when we were attacked by the Italians?
Item 151	Who was the leader of the Russians in the Second World War?	Who was the leader of the Italians?
Item 152	What was Mae West famous for?	Who was Koutalianos?
Item 153	Who was the famous flyer who was kidnapped?	Do you remember the name of Thessaloniki's serial killer?
Item 154	What is the name of the Queen?	Who is currently the Prime Minister?
Item 155	Who will follow the Queen?	Who is the leader of the Democrats?
Item 156	What is the name of the Prime Minister?	Who is the leader of the opposition party?
Items 158 and 161	apple, table, and penny	apple, table, and drachma
Items 171 and 178	British postal address	Greek postal address
Item 175	British money of 5 pence and 10 pence	Greek money of 5 and 20 drachmas, this change affected the answers to the calculation questions of items 176 and 177

The Greek version of the CAMCOG was obtained from Dr Fountoulakis and Dr Tsolaki, and this was the version administered to GA with the exception of the following items. Item 128 “What floor of the building are we on?” was inappropriate in a community setting as participants resided in single storey homes. In order that the orientation subscale total score, and therefore total CAMCOG total score, would not be different between the GA and GN, item 128 was coded in the following manner. The mean of the orientation subscale for the GA group was computed and item 128 was coded 1 if GA participants scored equal to or higher than the orientation group mean, and the item was coded 0 if participants scored lower than the group mean. Item 145 (the cookie theft picture) was optional and was not included in the administration of the CAMCOG to GA. Item 154 was changed to “Who is currently the Australian Prime Minister?” Coins used in tactile perception, item 175, were changed from drachmas to the Australian coins of 5 cents and 50 cents, this change affected the answers to calculation questions of items 176 and 177. Item 185, namely the ability to recognize two people, was taken from the Dementia Scale of Blessed et al. (1968) and was originally intended for use in a clinical setting where the subject could be asked to recognize people and discriminate their roles, such as doctors and nurses. Since this test was inappropriate for our sample of community dwellers seen in their own home, the item was changed to asking the participant if they recognized the examiner’s role, and where applicable if they recognized a family member.

2.2.2 *The Mini Mental Status Examination (MMSE)*

The Mini-Mental State (variously known as MMS or MMSE) was developed to assist physicians in the clinical setting with the cognitive grading of patients. Although the MMSE is not a formal psychometric instrument, it has been used extensively in psychiatry, clinical psychology, and social work for the past 30 years and it is the most widely used and studied screening measure of cognitive impairment (Polanski & Hinkle, 2000). The rationale in developing the MMSE was that the batteries of that time assessing cognitive mental status were lengthy and elderly patients, particularly those with delirium or dementia, were only able to participate in assessment for a short period of time (Folstein, Folstein, & McHugh, 1975). The ‘Mini’ refers to only the cognitive aspects of mental functioning and does not deal with measurement of mood, abnormal mental experiences and disordered forms of thinking. The MMSE has a maximum score of 30 points and consists of seven categories with questions from each category representing a different cognitive domain or function. The categories are as follows: Orientation to time (5 points); Orientation to place (5 points); Registration of three words (3 points); Attention and Calculation (5 points); Recall of three words (3 points); Language including the ability to name and the ability to follow verbal and written commands, and the ability to write a sentence spontaneously (8 points); and Visual Construction, i.e. the ability to copy a complex polygon similar to a Bender-Gestalt Figure, (1 point). Of note, originally all of the orientation questions were combined into orientation category, and the visual construction task was classified as one of the language items (Folstein, Folstein, & McHugh, 1975).

2.2.2.1 Psychometric Properties of the MMSE

Folstein, Folstein, and McHugh (1975) based the validity and reliability of the MMSE on a heterogenous group of 206 patients with a variety of disorders (dementia, depression, pseudodementia, mania, schizophrenia and personality disorders) and in 63 normal subjects. The MMSE successfully separated the diagnostic groups of dementia (with a mean score 9.7), depression with cognitive impairment (mean score of 19.0), and depression (mean score of 25.1). The mean score for normals was 27.6. It was concluded that the MMSE scores agreed with the clinical opinion of the presence of cognitive difficulty and as the cognitive difficulty was generally less in depression than in dementia, the scores were spread in a manner agreeing with the severity of the difficulty. Concurrent validity was assessed by correlating MMSE scores with the Wechsler Adult Intelligence Scale (WAIS). The correlation of 0.776 was obtained for verbal IQ and 0.660 for performance IQ between the two instruments. Reliability was assessed with 24 hour test-retest reliability with the same examiner (0.89) and between examiners (0.83). The patients who were clinically stable were measured over 28 days with a correlation of 0.98. Folstein et al., (1975) concluded that the MMSE was a valid test of cognitive function, as it separated participants with cognitive disturbance from those without such disturbance, and as its scores followed changes in participants' cognitive state. In addition, MMSE scores correlated with a standard test of cognition, the WAIS.

Originally, a cut-off score of 20 was suggested to indicate cognitive impairment (Folstein, Folstein, & McHugh, 1975); however, a score of 23/24 has generally been accepted as indicating the presence of cognitive impairment. A thorough review of the

MMSE by Tombaugh and McIntyre (1992) provided data on 25 studies. Using clinical diagnosis as the gold standard, a carefully controlled study by Anthony, LeResche, Niaz, von Korff, and Folstein (1982) demonstrated a sensitivity of 87% and specificity of 82%. Furthermore, approximately three quarters of the 25 studies reviewed showed a similar level of sensitivity. For specificity, a mean value of 86% was found in 21 studies that reported specificity including a range of 46 – 100%. The positive predictive value of 79% was reported in the majority of studies. Correlation of MMSE with other cognitive screening tests falls into the range of 0.60 – 0.90. Tombaugh and McIntyre (1992) reported that the MMSE had modest to high correlations with various cognitive tests including with the Wechsler Memory Scale, Trails B, and digit span.

Age, education, ethnicity and social class have been reported to have a significant affect on MMSE performance. Tombaugh and McIntyre (1992) reported that numerous studies demonstrated that MMSE scores decreased as age increased, and that these age affects persisted despite subjects being stratified by education level. MMSE scores have also been shown to be related to educational attainment. In particular, research indicates that low educational levels increase the likelihood of misclassifying normal subjects as cognitively impaired, and it has also been speculated that higher education levels may mask mild impairment. Effects of ethnicity, social class and socioeconomic status on MMSE scores were also noted (Tombaugh & McIntyre, 1992).

Folstein, Folstein, and McHugh (1975) emphasised that the MMSE is not a diagnostic test and that it only serves in a screening capacity to assess the severity of cognitive

impairment and hence to determine the need for further evaluation. In addition, the MMSE does not cover all the areas of cognition that are required for a diagnosis of dementia as defined by current diagnostic criteria in the DSM-IV; in particular it does not assess executive function. Nonetheless the MMSE has been widely used in various settings including clinical settings, in clinical and therapeutic research, imaging and clinicopathological studies, in community settings and longitudinal research (Brayne, 1998).

2.2.2.2 Psychometric Properties of the Greek MMSE

The MMSE has been translated into a variety of languages including Spanish, Sinhalese, Hebrew, Italian, Hindi, Finish, Chinese, Gujarati, Korean, French, Dutch, Hungarian, Japanese and Icelandic. Fountoulakis, Tsolaki, Chantzi, and Kazis (2000) investigated the utility of the MMSE in Greece. The MMSE was translated into Greek, and was administered by a trained physician, or trained senior medical student, who had no knowledge of the participants' diagnosis. Fountoulakis et al., (2000) recruited 87 participants with dementia and 64 participants without dementia. Participants with dementia had a mean of 68.05 years of age, and a standard deviation of 11.72 years of age, and a mean of 5.71 years of education, and standard deviation of 2.95 years of education. Participants without dementia had a mean of 68.57 years of age, standard deviation of 10.32, and mean of 6.18 years of education, and standard deviation of 3.20. The authors reported that neither diagnostic group was homogeneous in order to obtain results that would be useful in clinical practice as well as in epidemiological surveys. The authors reported that the MMSE appeared to have high test-retest reliability,

Spearman's coefficient $\rho = 0.98$ ($p < 0.001$), and that a cut-off score of 23/24 had a sensitivity of 90.80, specificity of 90.62, and positive predictive value of 92.94. However, the authors noted that the MMSE scores were not normally distributed in the Greek population and that a ceiling effect was evident. The investigators reported that the MMSE was less sensitive to the detection of cognitive decline in highly intelligent or well educated persons, and it also had a tendency to falsely diagnose participants, with a low educational level, as having cognitive impairment. The investigators also reported that the MMSE lead to twice as many false negative results in male subjects. They postulated that this may have possibly been due to differences in education as well as subclinical depressive symptomatology. However, the authors noted that this was more frequently observed in female subjects, and therefore were not able to identify the reason for the difference in the false negative results between genders.

2.2.3 The Geriatric Depression Scale (GDS)

In order to exclude a confounding effect of possible lowered mood on cognitive performance the GDS short 15 item form was also administered to participants. The Geriatric Depression Scale (GDS) is a 30-item, self-administered or interviewer-administered rating scale designed as a screening instrument used to assess depressive symptomatology in the elderly. The items require answers in a "yes" or "no" format in relation to how they felt during the past week, with 20 items coded positively and 10 items coded negatively. The GDS was developed specifically for older individuals (over 55 years of age) by Brink, Yesavage, Lum, Heersema, Adey, and Rose (1982) and it omits items which the authors considered inappropriate, such as items dealing with guilt,

sexuality and suicide, as well as items focusing on psychosomatic complaints, as these tend to be more common in the aging population.

2.2.3.1 Psychometric Properties of the GDS

A total of 100 statements about depression in later life were reduced to 30 items using item-total correlations. The 30 item-total correlations of the scale ranged from .32 to .83 with a mean of .56. Internal consistency as measured by the coefficient alpha was .94, and split-half reliability was .94. A score of 0 to 10 was selected as being within the normal range, and a score of 11 or higher is indicative of the presence of depression with 84% sensitivity and 95% specificity. A score of 11 to 20 was considered to reflect mild depression, and a score between 21 and 30 was indicated moderate to severe depression. Test-retest reliability ranged from .85 to .98 at 7 to 10 days (Brink et al., 1982). Parmelee, Lawton, and Katz (1989) reported that the GDS had a clean factor structure, with dysphoria identified as the major factor, and worry and apathy were identified as minor factors.

The GDS has been validated in a number settings including within the community as well as medical settings, and in cognitively intact and impaired individuals (Herrmann, Mittmann, Silver, Shulman, Busto, Shear, et al., 1996). Stiles and McGarrahan (1998) conducted a comprehensive review of published articles investigating the psychometric properties and utility of the English version GDS and concluded that, overall, the studies reviewed supported the validity of the GDS as a useful tool for screening for depression in the elderly. Good concurrent validity was established by correlations of .84 with the

Zung Self-Rating Depression Scale, of .82 with the Depression Symptom Checklist, and of .73 with the Beck Depression Inventory (Dunn & Sacco, 1989; Yesavage et al., 1983; and Hyer & Blount, 1984). Criterion validity as measured by Yesavage et al. (1983) against the Research Diagnostic Criteria was reported as .82. Discriminant validity between mildly demented depressed and non depressed individuals, and between demented and depressed individuals, has been reported to be satisfactory (Yesavage et al., 1983; and Folstein et al., 1975). However the GDS reportedly loses some validity in patients with advanced dementia (Brink, 1984; and Gilley & Wilson, 1997).

The GDS short 15 item form is an abbreviated version of the original 30 item scale and was designed to facilitate assessment of frail elderly individuals who fatigue quickly and have poor ability to concentrate when completing long questionnaires. Items for the short form were selected based on their correlations with depressive symptoms, hence, the 15 items that had the highest correlation with depressive symptoms constitute the GDS short 15 item form (Brink et al, 1982). The 15 item form has been found to correlate significantly with the longer version of the scale ($r = .84, p < .001$) and to have similar levels of sensitivity and specificity. Scores range from 0 to 15, with scores greater than 5 indicating significant depressive symptoms. A score of 0 to 4 has been reported to be normal, 5 to 9 is considered to reflect mild depression and 10 to 15 indicates moderate to severe depression (Baker & Miller, 1991; Burke, Roccaforte, & Wengel, 1991). Leshner and Berryhill (1994) compared the GDS 30 and 15 item forms with a sample of depressed, demented, and thought-disordered inpatients. The authors reported that both GDS forms were highly correlated ($r = .89, p < .001$), and that the 15 item form was an

acceptable substitute for the 30 item form for patients without dementia. Leshner and Berryhill also reported that the 15 item form has a similar diagnostic validity to the 30 item form, as the sensitivity ratings for both forms was .91 (when the cut off was set to detect mild depression at 5 and 11 points respectively), and the specificity ratings was .54 for the 15 item form and .42 for the 30 item form. The authors also reported that the sensitivity and specificity for the two forms were also very similar when the cut-off was set to detect severe depression. Leshner and Berryhill concluded that given their findings, the best overall cut-off for the 15 item form is 7. A recent study by Lyness, Noel, Cox, King, Conwell, and Caine (1997) reported that the 15 item form had a sensitivity of 92% and a specificity of 81% using a cutoff point of 5.

2.2.3.2 Psychometric Properties of the Greek GDS

Fountoulakis, Tsolaki, Iacovides, Yesavage, O'Hara, Kazis, et al. (1999) investigated the utility of the GDS 15 item form in Greece. The GDS was translated into Greek, and was back translated to English without the back translator being aware of the original text. The researchers reported that all of the items were easily translatable. Fountoulakis et al. recruited 168 non-depressed participants, and 103 participants with a clinical diagnosis of depression (all participants were over 65 years of age). The GDS was administered by an interviewer since many of the Greek elderly participants were reportedly unable to self administer the questionnaire due to host of reasons including vision deficits, motor deficits and illiteracy. The GDS-15 was found to have high internal consistency, with a Cronbach's alpha of .94. Principal Components Analysis with Varimax Normalized Rotation produced four factors which explained 62% of the total variance (depressive

thought/cognitive factor, depressed mood factor, social isolation and functioning factor, and feelings of helplessness and fear for the future factor). The two participant groups differed on all four factors at a p value of $< .001$. Fountoulakis et al. reported that a score of 6/7 was found to be the best cut-off point for detecting depression in the elderly Greek population, with a sensitivity of 92% and specificity of 95%.

2.3 Procedure

The recruitment and testing of participants was conducted by a bilingual researcher, fluent in both Greek and English, the researcher had recent exposure to Greek culture in Greece as well as in the Greek-Australian community. During recruitment potential participants were informed that the investigator required participants without a diagnosis of neurological, vascular or psychiatric condition. Prior to the commencement of testing participants were required to sign an informed consent form that was written in English as well as Greek (refer to Appendix B). The participation requirements were also printed on the consent form. Therefore, potential participants could refrain from signing a consent form if they had a neurological, vascular or psychiatric diagnosis without providing personal information. To ensure that the participants understood the consent form, participants were asked to repeat the information to the examiner. Where participants were unable to read, the informed consent form was read to them. Participants were informed that they were free to withdraw from the study at any time and there was no monetary gain offered for participation.

The assessment was usually conducted at the participants home and where possible in a quiet private room. On occasion the participants requested that the assessment be conducted in common living areas, such as the kitchen or dining area where background noise was present, and in the presence of their spouse. Rapport building and interview process generally took about 30 minutes. The administration of the assessment section also took approximately 30 minutes, and most participants did not require a break during testing.

Participants' background information, including age, date of entry in Australia, current marital and occupation status, was collected. Participants were also asked to rate their level of fluency in spoken Greek and English as poor, moderate or good. Following the collection of background information, Section A (the structured psychiatric interview) and Section B (the cognitive examination) of the Greek version of the CAMDEX schedule were administered in Greek. The GDS short 15 item form was then administered, followed by Section F of the CAMDEX, where current medications were recorded. Section C of the CAMDEX (observations of present mental state, appearance and demeanor), was completed at the end of the assessment.

2.4 Ethics Approval

Research ethics approval was granted by the Ethics Committee of the Psychology Department, Victoria University on 14th February 2001 (see Appendix C).

CHAPTER 3

Results

CHAPTER 3: RESULTS

3.1 Summary of Preliminary Analyses

Prior to conducting analyses to explore relationships among variables preliminary checks were conducted for accuracy of data entry, missing values, univariate outliers, and fit between the variables distributions. The results of evaluation of assumptions of normality, homogeneity of variance-covariance matrices, linearity, and multicollinearity were satisfactory with no serious violations noted. Covariates were judged to be adequately reliable for covariate analysis. Bonferonni adjusted level of significance of .025 was applied to results.

3.2 Comparison of GA and Gn CAMCOG Performance

To examine the hypothesis that GA would differ from Gn on the CAMCOG, and that there may be gender differences between the samples, a between subjects analysis of covariance (ANCOVA) was performed with CAMCOG total score as the dependent variable and Group (GA and Gn) as the first independent variable. The second independent variable was Gender with two levels, females and males. Given that Gn were significantly older than the GA, and that male participants were significantly more educated than female participants, age and education were placed as covariates. Both age and education were significantly related to CAMCOG performance. There was a significant negative linear relationship between participant's age and performance on CAMCOG, $F(1,136) = 12.767, p < .001$, showing that older participants obtained lower

CAMCOG scores than younger participants. In addition, there was a significant positive linear relationship between participants years of education and performance on CAMCOG, $F(1,136) = 10.466, p < .01$, that is, participants with more years of education obtained higher CAMCOG scores than participants with fewer years of education.

Having adjusted for differences in age and years of education, there was a significant difference between GA and Gn performance on the CAMCOG $F(1,136) = 80.617, p < .001$. Gn obtained significantly higher scores on CAMCOG ($M = 85.21, SD = 8.57$) than GA participants ($M = 73.15, SD = 9.87$). There was also a significant difference between females and males performance on CAMCOG, $F(1,136) = 15.381, p < .001$. Overall, males obtained higher scores than females on CAMCOG (males M CAMCOG score = 83.73, $SD = 8.12$, females M CAMCOG score = 75.92, $SD = 11.90$). In addition, there was a significant interaction of Group by Gender on CAMCOG performance, $F(1,136) = 7.805, p < .01$. This interaction is depicted in Figure 3.1, examination of the figure demonstrates that GA females scored lower (estimated marginal mean = 68.752, $SE = 1.247$) than GA males (estimated marginal mean = 78.078, $SE = 1.599$), and GA females also scored lower than Gn females (estimated marginal mean = 84.967, $SE = 1.369$), and Gn males (estimated marginal mean = 86.770, $SE = 1.252$).

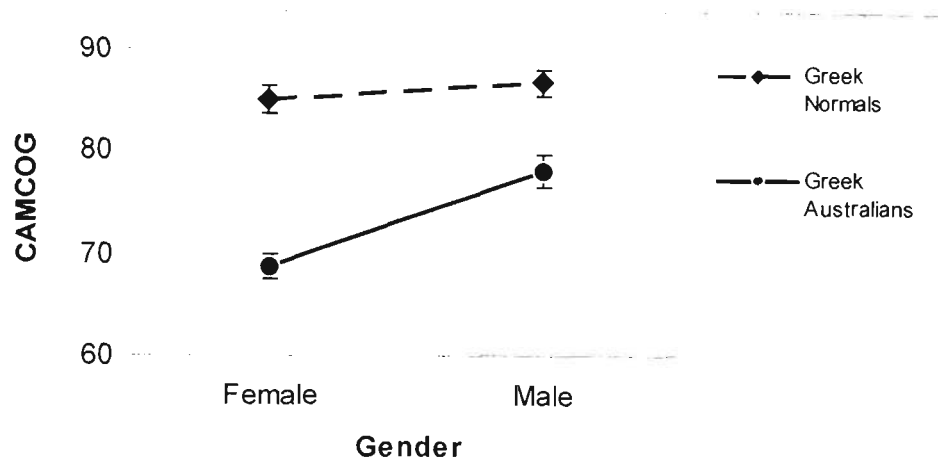


Figure 3.1 CAMCOG Scores for GA and Gn

3.2.1 Comparison of GA and Gn CAMCOG Subscale Performance

Given the significant difference between GA and Gn performance on CAMCOG, and in addition the significant difference between GA females and males performance on CAMCOG, a post hoc analysis of the CAMCOG subscales was conducted to investigate whether there were particular patterns of performance.

Box's Test of Equality of Covariance Matrices indicated violation of the homogeneity of covariance assumption ($p = .000$). Therefore the conservative Pillais Trace statistic was chosen to investigate significant differences as the Pillais Trace is less susceptible to violations of the assumption of homogenous variances and covariances, and an adjusted level of significance of .025 was applied to results (Tabachnick & Fidell, 1996).

A two-way between groups multivariate analysis of covariance (MANCOVA) was performed to investigate group differences on measures of cognitive performance on ten dependent variables, CAMCOG subscales listed as follows; Orientation, Language

Comprehension, Language Expression, Memory Remote, Memory Recent, Memory Learning, Attention/Concentration and Calculation, Praxis, Abstract Thinking, and Perception. First independent variable was participant groups with two levels, GA and Gn, and the second independent variable was Gender with two levels, females and males. Given that Gn were significantly older than the GA, and that male participants were significantly more educated than female participants, age and education were placed as covariates.

Both age and education were significantly related on the combined dependent variables, for age $F(10, 127) = 3.367, p = .001$, Pillais Trace = .210, and for education $F(10, 127) = 2.644, p = .01$, Pillais Trace = .172. There was also a statistically significant difference between GA and Gn performance on the combined dependent variables, $F(10, 127) = 27.094, p < .001$, Pillais Trace = .681. Gender was also found to be significantly related to the combined dependent variables, $F(10, 127) = 5.524, p < .001$, Pillais Trace = .303. In addition there was a significant interaction between groups and gender and performance on the combined dependent variables, $F(10, 127) = 3.727, p < .001$, Pillais Trace = .227.

However when the results were considered separately for the dependent variables age was only significantly related to performance on Language Expression, $F(1, 136) = 17.612, p < .001$, Praxis, $F(1, 136) = 9.963, p < .01$, Abstract Thinking, $F(1, 136) = 10.026, p < .01$, and Perception, $F(1, 136) = 6.858, p = .01$. Education was only significantly related to performance on Language Comprehension, $F(1, 136) = 8.333, p =$

.01, Attention/Concentration and Calculation, $F(1, 136) = 13.966, p < .001$, and Abstract Thinking, $F(1, 136) = 5.264, p < .025$.

Having adjusted for the effect of age and education there was a significant difference between GA and Gn performance on all but the Memory Learning subscale ($p > .025$). There was a significant difference between GA and Gn performance on Orientation, $F(1, 136) = 33.699, p < .001$, Language Comprehension $F(1, 136) = 154.028, p < .001$, Language Expression $F(1, 136) = 36.069, p < .001$, Memory Remote $F(1, 136) = 61.583, p < .001$, Memory Recent $F(1, 136) = 30.916, p < .001$, Attention/Concentration and Calculation $F(1, 136) = 29.503, p < .001$, Praxis $F(1, 136) = 9.349, p < .01$, Abstract Thinking $F(1, 136) = 28.171, p < .001$, and Perception $F(1, 136) = 23.613, p < .001$.

Pairwise comparisons indicated that Gn scored significantly higher than GA on Orientation (mean difference = .571, $p < .001$), Language Comprehension (mean difference = 1.425, $p < .001$), Language Expression (mean difference = 2.129, $p < .001$), Memory Remote (mean difference = 1.587, $p < .001$), Memory Recent (mean difference = .784, $p < .001$), Attention/Concentration and Calculation (mean difference = 1.537, $p < .001$), Praxis (mean difference = .963, $p < .001$), Abstract Thinking (mean difference = 1.966, $p < .001$), and Perception (mean difference = 1.265, $p < .001$). There was a significant main effect of gender of performance on Memory Remote, $F(1, 136) = 36.925, p < .001$, Memory Recent $F(1, 136) = 28.115, p < .001$, and Attention/Concentration and Calculation $F(1, 136) = 8.401, p < .01$. Pairwise comparisons indicated that males performed higher than females on Memory Remote

(mean difference = 1.257, $p < .001$), on Memory Recent (mean difference = .765, $p < .001$), and on Attention/Concentration and Calculation (mean difference = .839, $p < .01$).

In addition, there was a significant interaction between GA and Gn and gender, and performance on Language Comprehension $F(1, 136) = 8.586, p < .01$, Memory Recent $F(1, 136) = 13.586, p < .001$, and Attention/Concentration and Calculation $F(1, 136) = 14.942, p < .001$. GA females scored lower on Language Comprehension (estimated marginal mean = 7.286, SE = .103) compared to GA males (estimated marginal mean = 7.744, SE = .132), GA females also scored lower compared to Gn females (estimated marginal mean = 9.038, SE = .113) and Gn males (estimated marginal mean = 8.842, SE = .104). GA females scored lower on Memory Recent (estimated marginal mean = 2.320, SE = .127) compared to GA males (estimated marginal mean = 3.589, SE = .163), GA females also scored lower compared to Gn females (estimated marginal mean = 3.608, SE = .139) and Gn males (estimated marginal mean = 3.869, SE = .127). GA females also scored lower on Attention/Concentration and Calculation (estimated marginal mean = 5.784, SE = .254) compared to GA males (estimated marginal mean = 7.685, SE = .326), GA females also scored lower compared to Gn females (estimated marginal mean = 8.383, SE = .279) and Gn males (estimated marginal mean = 8.160, SE = .255).

3.3 Comparison of GA and Gn MMSE Performance

To examine the hypothesis that GA would differ from Gn on the MMSE, and that there may be gender differences between the groups, a between subjects ANCOVA was performed with MMSE total score as the dependent variable, and with two independent

variables. The first independent variable was Group (GA and Gn) and the second independent variable was Gender (females and males). Given that Gn were significantly older than GA, and that male participants were significantly more educated than female participants, age and education were again placed as covariates. There was a significant positive linear relationship between participants' years of education and performance on MMSE, participants with more years of education obtained higher MMSE scores than participants with fewer years of education, $F(1,136) = 10.627, p = .001$. However participants' age was not significantly related to MMSE performance $F(1,136) = 1.386, p = .241$.

Having adjusted for differences in education, there was a significant main effect of Group on the MMSE $F(1,136) = 58.499, p < .001$. Gn obtained significantly higher scores on MMSE ($M = 27.50, SD = 2.32$) than GA participants ($M = 24.23, SD = 2.95$). There was no significant difference between females and males performance on MMSE $F(1,136) = 3.709, p = .056$. However, there was a significant interaction between participant groups and gender on MMSE performance, $F(1,136) = 6.923, p = .01$. As can be seen in Figure 3.2 GA females scored lower (estimated marginal mean = 23.361, SE = .387) compared to GA males (estimated marginal mean = 25.308, SE = .496), and GA females also scored lower compared to Gn females (estimated marginal mean = 27.751, SE = .425), and Gn males (estimated marginal mean = 27.500, SE = .388).

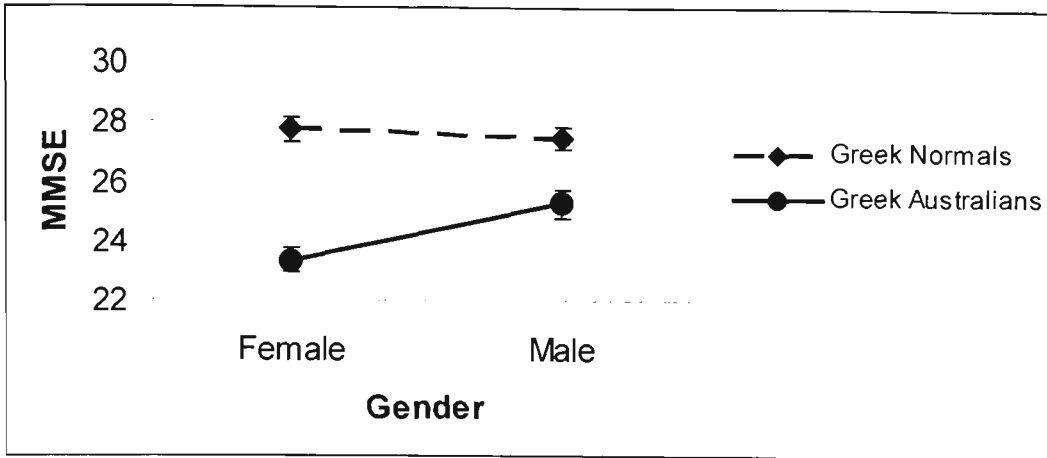


Figure 3.2 MMSE Scores for GA and Gn

3.4 Comparison of GA and GID, and GD CAMCOG Performance

Given that GA performed significantly lower than Gn on CAMCOG, a post hoc analysis was conducted to investigate whether the CAMCOG could differentiate between GA normal elderly and Greek Nationals with cognitive symptomatology and diagnosis of dementia. To examine whether GA would differ from the GID and the GD group on the CAMCOG, and that there may be gender differences between the samples, a between subjects ANCOVA was performed with CAMCOG total score as the dependent variable and Group (GA, GID and GD) as the first independent variable. The second independent variable was Gender with two levels, females and males. Age and education were placed as covariates. Levene's test of homogeneity of variance indicated that the assumption of error variance of the CAMCOG was unequal across Groups ($p < .001$). The CAMCOG distribution was negatively skewed, it was reflected and a logarithmic transformation was applied, however following transformation the distribution of scores were still skewed and there did not appear to be an advantage to transformation. Given that, to the best of the author's knowledge, there is no equivalent non-parametric test that includes analysis

with covariates, and that with relatively equal sample sizes analysis of variance analyses are reportedly robust to violation of homogeneity of variance, it was decided to continue with the ANCOVA. In addition, a conservative approach was taken to reduce Type I error by using the more stringent level of significance of .025.

There was a significant negative linear relationship between participants' age and performance on the CAMCOG, older participants obtained lower CAMCOG scores than younger participants, $F(1,220) = 5.303, p < .025$. However, participants' years of education was not significantly related to CAMCOG performance, $F(1,220) = 1.039, p = .309$.

Having adjusted for differences in age there was a significant difference between GA, GID and GD performance on the CAMCOG, $F(1,220) = 77.666, p < .001$. GA participants obtained significantly higher scores on CAMCOG ($M = 73.15, SD = 9.87$) than GD participants ($M = 51.63, SD = 18.31$), and GID also obtained significantly higher scores on CAMCOG ($M = 77.62, SD = 9.74$) than GD participants. However, although GID obtained higher scores than GA on the CAMCOG this was not significant (mean difference = 4.463, $SE = 2.514, p = .232$). As can be seen in Figure 3.3, although females tended to perform lower than males, Gender was not significantly related to CAMCOG performance, $F(1,220) = 3.145, p = .078$. In addition, the interaction between Groups and Gender on CAMCOG was not significant, $F(2,220) = 3.379, p = .036$.

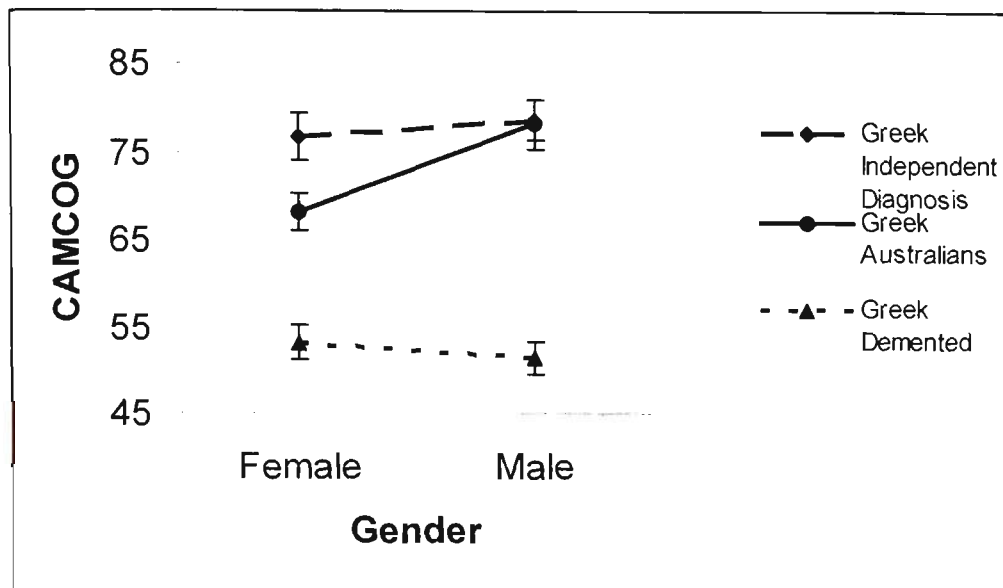


Figure 3.3 CAMCOG Results for GA, GID and GD

3.5 Comparison of GA and GID, and GD MMSE Performance

Given that GA performed significantly lower than Gn on MMSE, a post hoc analysis was conducted to investigate whether the MMSE could differentiate between GA normal elderly and Greek Nationals with cognitive symptomatology and diagnosis of dementia. To examine the hypothesis that GA would differ from the GID and the GD group on the MMSE, and that there may be gender differences between the samples, a between subjects ANCOVA was performed with MMSE total score as the dependent variable and Group (GA, GID and GD) as the first independent variable. The second independent variable was Gender with two levels, females and males. Age and education were placed as covariates. Levene's test of homogeneity of variance indicated that the assumption of error variance of the MMSE was unequal across Groups ($p < .001$). The MMSE distribution was negatively skewed, it was reflected and a logarithmic transformation was applied, however following transformation the distribution of scores were still skewed

and there did not appear to be an advantage to transformation. As discussed previously, given that, to the best of the author's knowledge, there is no equivalent non-parametric test that includes analysis with covariates, and that with relatively equal sample sizes analysis of variance analyses are reportedly robust to violation of homogeneity of variance, it was decided to continue with the ANCOVA. In addition, a conservative approach was taken to reduce Type I error by using the more stringent level of significance of .025.

Both covariates age and education were not significantly related to MMSE performance, $F(1,220) = .031, p = .861$, and $F(1,220) = .276, p = .276$, respectively. There was a significant difference between GA, GID and GD performance on the MMSE, $F(2,220) = 110.141, p < .001$. GA participants obtained significantly higher scores on MMSE ($M = 24.23, SD = 2.94$) than GD participants ($M = 17.29, SD = 4.96$), GID also obtained significantly higher scores on MMSE ($M = 25.59, SD = 2.13$) than GD. Although GID obtained higher scores than GA on the MMSE this was not significant (mean difference = 1.167, $SE = .686, p = .271$). As is illustrated in Figure 3.4, although female scores on MMSE tended to be lower than males, Gender was not significantly related to MMSE performance, $F(1,220) = 4.742, p = .030$. In addition, the interaction between Groups and Gender on MMSE was not significant, $F(2,220) = 1.124, p = .327$.

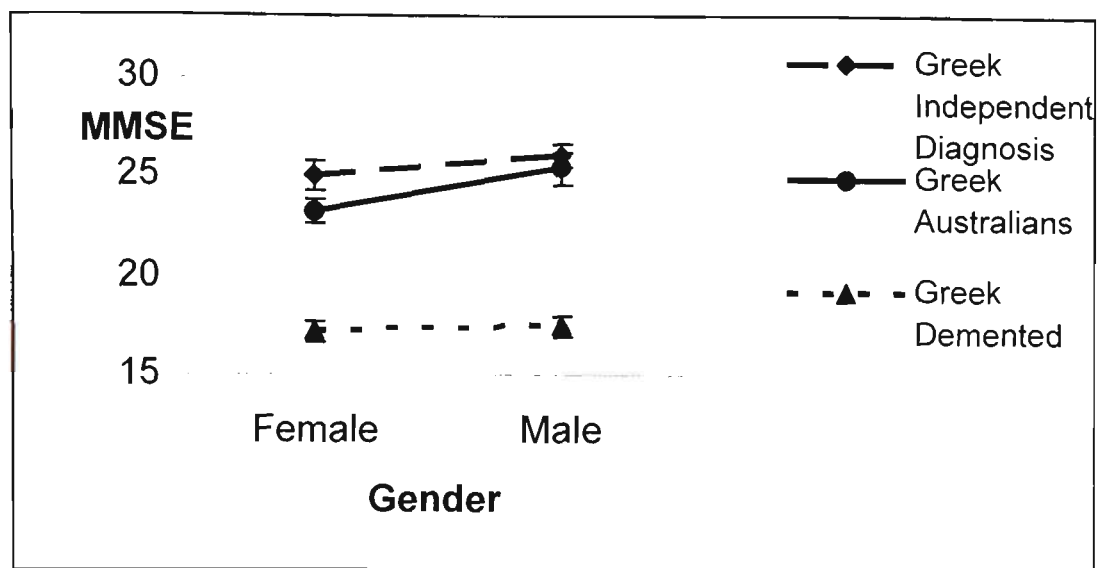


Figure 3.4 MMSE Results for GA, GID and GD

CHAPTER 4

Discussion

CHAPTER 4: DISCUSSION

4.1 Restatement of Rationale and Aims

The accurate diagnosis of dementia and other cognitive disorders is likely to become an increasingly important issue for neuropsychologists and health services in general due to the ageing population (LoGiudice, Hassett, Cook, Flicker, & Ames, 2001). The first generation of migrants are getting older and are at an age where they are most at risk of cognitive illnesses such as dementia. GA constitute one of the largest ethnic groups within Australia (ABS, 2001a). Although the diagnostic accuracy of neuropsychological tests on Western English speaking countries has been well documented, diagnostic inaccuracies have been reported when these tests, and western norms, are systematically applied to CALD groups (Artiola i Fortuny, 2004).

Cross cultural researchers have argued that some of the most important variables that play a role in the measurement of human brain function are cultural and educational in nature (Ardila, Rosselli, & Puente, 1994) and as such caution against the practice of using Western norms on CALDI as they do not take into account CALD backgrounds and experiences (Suzuki & Kugler, 1995; cited in Ridley & Li, 1998). In order to improve the psychometric properties of cognitive tests Greek National (GN) researchers standardized and validated a number of Western tests in Greece, including the Cambridge Cognitive Examination of the Elderly (CAMCOG), (Tsolaki, Fountoulakis, Chantzi & Kazis, 2000) the Mini Mental Status Examination (MMSE) (Fountoulakis, Tsolaki, Chantzi & Kazis,

2000), and the short form of the Geriatric Depression Scale (GDS), (Fountoulakis, Tsolaki, Iacovides, Yesavage, O'Hara, Kazis & Ierodiakonou, 1999). They reported that their sample obtained lower cut-off scores on the CAMCOG in comparison to the British sample. The authors concluded that these differences were likely due to cultural and educational differences between the groups (Tsolaki, Fountoulakis, Chantzi & Kazis, 2000). In contrast to the CAMCOG findings, the investigators reported that their sample obtained comparable MMSE cut-off scores as reported by other studies (Fountoulakis, Tsolaki, Chantzi & Kazis 2000). Fountoulakis, Tsolaki, Iacovides, Yesavage, O'Hara, Kazis and Ierodiakonou (1999) also investigated the utility of the GDS 15 item form in Greece. The authors reported that similar to the MMSE study findings that their group obtained comparable cut-off scores as reported by other studies.

Currently there is no research regarding possible differences in cognitive test performance between GA and English speaking Australians. Given the cultural and linguistic characteristics of the GA elderly migrants, for instance generally low levels of literacy and poor English proficiency, as compared to English speaking Australians, and given that GN obtained lower CAMCOG cut-off scores than the British sample, it was anticipated that the use of mainstream English neuropsychological forms and norms to evaluate dementia in GA would be inappropriate due to the risk of inaccurate diagnosis. Few studies have compared cognitive test performance between migrants to individuals from their country of origin. However, bilingual status, acculturation, and country of residence have been linked with cognitive test performance differences (Boland, 2005; Manly & Miller et al., 1998; Berry, 1997; Ardila & Rosselli et al., 2000; Lopez &

Taussig, 1991; Touradji, Manly, Jacobs & Stern, 2001; Artiola i Fortuny, Heaton & Hermosillo 1998; Gonzales & Roll, 1985).

There is a clear gap in the literature regarding the performance of GA as compared to GN on tests of cognition. Although GA and GN have similar cultural values and beliefs, given the ecological context hypothesis (Ardila, Rosselli & Puente, 1994) it is likely that there are cultural and linguistic differences between GA and GN. Hence, it was hypothesised that GA would obtain lower scores on tests of cognition, as measured by CAMCOG and MMSE, compared to GN. In order to exclude a confounding effect of possible lowered mood on cognitive performance the GDS short 15 item form was also administered to participants.

Because there is a paucity of research that has compared the cognitive test performance between GA and GN the present study aimed to investigate whether the cognitive test performance of healthy community dwelling long-term GA migrants was comparable to a demographically similar group of GN. The study also aimed to investigate whether test norms available for GN elderly on tests of dementia and cognitive functioning, namely the CAMCOG and MMSE, were appropriate for use with GA. Furthermore, the current study also investigated the utility of the CAMCOG and MMSE and aimed to establish a baseline for future research of dementia assessment and cognitive functioning in GA elderly.

4.2 Present Findings

4.2.1 *Interpretation and Summary of the Main Findings*

The results of the current study supported the hypotheses that GA would obtain lower scores on tests of cognition, as measured by CAMCOG and MMSE, compared with healthy, non-demented, 'normal' Greek individuals (Gn). Outcomes of each of the tests will be discussed individually in the following sections. GA's responses on the GDS short 15 item form indicated minimal depressive symptomatology, which is not considered to be indicative of depression.

4.2.1.1 *Comparison of GA and Gn CAMCOG Performance*

In keeping with previous studies in this area both age and education were significantly related to CAMCOG performance in the present study (Brayne, Gill, Paykel, & Huppert, 1995; Huppert et al., 1995; Williams, Huppert, Matthews, & Nickson, 2003). Older participants obtained lower CAMCOG scores than younger participants. Participants with more years of education obtained higher CAMCOG scores than participants with fewer years of education. Having adjusted for effects of age and years of education on CAMCOG performance, both GA females and males obtained CAMCOG scores that were significantly lower than Gn participants. Although Gn females and Gn males did not differ in their CAMCOG scores, GA females scored significantly lower than GA males. Although this effect of gender on cognitive test performance was not observed in the Gn group it has been reported in previous studies conducted in the UK (Huppert et al., 1995; Brayne, Gill, Paykel, & Huppert, 1995; Williams, Huppert, Matthews, & Nickson, 2003).

A post hoc subscale analysis revealed that Gn scored significantly higher than GA on all but the Memory Learning subscale of the CAMCOG. Overall, males performed higher than females on Memory Remote, Memory Recent, and on Attention/Concentration and Calculation subscales. In addition, there was a significant interaction between GA and Gn and gender and performance on Language Comprehension, Memory Recent, and Attention/Concentration and Calculation. GA females scored lower on these three subtests as compared to GA males, Gn females, and Gn males. These findings are considered to be partially consistent with previous studies which reported that gender was significantly related to scores obtained on the attention, calculation, praxis and perception subscales (Huppert et al., 1995; Brayne, Gill, Paykel, & Huppert, 1995). Brayne, Gill, Paykel, and Huppert (1995) reported that when measuring attention men tend to perform better on calculation items and women tend to perform better on language items. Huppert et al. (1995) stated that one reason for finding gender difference in their study may have been because they restricted their attention item to a calculation task rather than recording the best score out of a calculation and language based tasks used to assess attention. In the current, and Gn study, assessment of attention and concentration was based upon calculation items. However, in addition to previously reported gender differences GA and Gn male participants performed higher than female participants on items assessing knowledge and memory of past historical events and recent knowledge of political figures. Furthermore, Gn females performed higher than GA female participants on items assessing recent knowledge of political figures and ability to follow verbal commands.

It is unclear, why these additional gender differences were observed in the current study findings. Possibilities for these differences may include reduced cultural significance for GA females, in terms of importance of recalling and maintaining knowledge of political figures, differences in understanding the terminology used during the provision of instructions, and lack of familiarity with the assessment process.

4.2.1.2 Comparison of GA and Gn MMSE Performance

Although in the present study age was not found to be significantly related to MMSE performance, there was a significant relationship between education and performance on the MMSE. Participants with more years of education obtained higher MMSE scores than participants with fewer years of education. Having adjusted for differences in education on MMSE performance, GA MMSE scores remained significantly lower than Gn. Although Gn females and Gn males did not differ in their MMSE scores, GA females scored significantly lower than GA males. These findings are considered to be partially consistent with previous studies, which reported that ethnicity, social class, and socioeconomic status was significantly related to scores obtained on the MMSE (Tombaugh & McIntyre, 1992). As noted previously, it is unclear, why these gender differences were observed in the current study findings. Possibilities may include GA gender differences in understanding the terminology used during the provision of instructions, and lack of familiarity with the assessment process.

4.2.2 *Implications from Main Findings*

Given that statistical adjustments were made for age and education on test performance, and that GA participants were younger than Gn participants, GA lowered performance on the CAMCOG and MMSE was not associated with cognitive changes related to aging. In addition, as there was no significant difference between GA and Gn reported years of education GA lower performance, in comparison to Gn, was not associated with education differences. Having accounted for the effects of age and education, this suggests that other factors mediated the cognitive performance of GA. Although studies comparing migrants to their peers from their country of origin are scarce, cognitive test performance differences have been noted (Boland, 2005; Manly & Miller et al., 1998; Berry, 1997; Ardila & Rosselli et al., 2000; Lopez & Taussig, 1991; Touradji, Manly, Jacobs & Stern, 2001; Artiola i Fortuny, Heaton & Hermosillo 1998; Gonzales & Roll, 1985). It is likely that by virtue of their migrant experience GA represent a cultural subgroup of Greeks. Due to ecological factors such as bilingual status and acculturation, it is likely that cognitive abilities, as measured by these tests, may be at a different level of skill due to different needs and experiences of GA (Ardila, Rosselli & Puente, 1994).

As Dimitreas (1996) noted the Hellenic individual requires a social milieu for intellectual stimulation and growth. Cross cultural research suggests that the vast range of skills initially taught during formal schooling (such as language fluency, literacy, numeracy, test taking familiarity and test-wiseness, and cognitive style in terms of abstract thinking processes and analytical cognitive styles versus functional use of knowledge, and the abilities to classify, serialise, and problem-solve) are maintained with the continued

interaction with peers, and that exposure to mass media facilitates a continued access to such knowledge and reinforces such learned abilities (Samuda et al., 1998; Nell, 2000; Kaufman, McLean & Reynolds, 1988; Acevedo et al., 2000). It is possible that skills taught during formal schooling were not maintained by GA, due to their migration experience, as they were limited by geographical factors in the amount of contact with peers and, and until recently access to mass media was limited to English which they lacked proficiency in and thus benefits of such exposure would have been limited.

Furthermore, due to acculturation factors GA have adopted certain English terminology, in which they are more comfortable communicating in, and tend to switch between Greek and English (this usually becomes more evident to GA when conversing with a GN who is monolingual) and as such they tend to lose familiarity of certain Greek words. GA also tend to utilise words which are an amalgamation of part English and part Greek phrasing. This further reduces their fluency in Greek. Due to their reduced exposure to mass media in Greek, they also lose proficiency in more technical or sophisticated terms and phrasing.

Overall, male participants performed better than female participants on CAMCOG subscales which included the type of knowledge and skills taught in formal schooling. These subscales included items assessing learned skills such as, historical facts, current world knowledge, and arithmetic. This performance difference is likely to be related to the finding that male participants were significantly more educated than female participants across both groups. However, GA females in particular obtained lower scores

on such items and on the Language Comprehension subscale which includes items assessing ability to follow up to three stage commands, and the ability to provide a yes/no response to incongruent as well as congruent language items.

Cross cultural researchers argue that language fluency is a skill and needs to be used on a daily basis to be maintained when one does not live, work, or study in an environment in which that language predominates. Where this does not occur it often results in a kitchen level of language, that is a basic use of everyday simple terminology (Artiola i Fortuny, 2004). In Greece, females managing the household would have had the opportunity to interact with their neighbours and with peers during their daily activities. GA females on the other hand would not have had this opportunity due to the lack of such a social milieu and reduced English fluency. Although in Greece most females tend to go about their daily activities independently, many GA females conduct such activities in the company of their husbands for various reasons, such as reduced fluency in English and lack of confidence, and reduced ability to access services in the community, particularly if they do not have a drivers licence.

Rosenthal, Bell, Demetriou, and Efklides (1989) reported that Greek immigrants tended to retain traditional Greek values. A traditional role of Greek males has been to work in order to provide for the family, and a traditional role of the Greek females has been to stay at home and manage the household as well as raise the children. Anecdotal experience suggests that GA have continued this tradition. In addition, participants responses regarding their employment status also supports this as 47% of GA male

participants reported that they were employed, compared to approximately only 8% of female GA participants. Therefore, male GA participants are likely to have had more of an opportunity than female GA participants to interact with peers and may have been in a better position to maintain skills learnt during their schooling and this may account for the discrepancy between GA male and female participant's performance on testing. Although necessity for a second income prompted female GA migrants to enter the workforce, often this was in industries where females could work from home (due to the burden of raising children without the support of social networks such as grandparents) or in positions where there was little opportunity for social interaction or little utility of knowledge or skills learnt during their time in formal schooling.

Interestingly the only subscale that GA did not obtain a significantly lower CAMCOG score in comparison to Gn was the Memory Learning subscale. Given that this assesses recall of recently presented small amounts of information (incidental learning as well as primed learning and recognition) and does not rely on past learning of historical facts, (such as the Memory Remote subscale) the Memory Learning subscale could potentially be the least influenced by cultural, linguistic and socialisation factors.

4.3 GA Cultural Differences during Assessment

Cultural differences in clinical interview participation, attitudes, beliefs and test taking behaviours have been reported to affect test performance (Moore, 1986; Ardila, 2005; Artiola i Fortuny, 2004). During the current study it was noted that GA attitude towards cognitive assessment differed from English speaking, high school educated individuals

(personal clinical experience). In particular, GA female participants rarely independently decided to participate in the study. They generally sought advice, and consent, from their husbands prior to doing so. In addition, both male and female GA participants requested that the assessment be conducted in the presence of their spouse. Most were accepting of the need to conduct the assessment separate from the other if they were both participating in the study, however, where only one person from a couple was eligible for participation in the study they had difficulty with the concept of not having their spouse present. Hence, this request was often honoured, despite concerns that a third party observer present during the assessment may influence their test performance (Kehrer, Sanchez, Habif, Rosenbaum, & Townes, 2000). It is unclear as to why GA participants wanted their spouse present. It is possible that given that this was an unfamiliar process that they felt more comfortable undergoing this process with their spouse. The implication in a clinical setting may be that GA may feel particularly uneasy about participating in such an unfamiliar activity.

It was also the examiner's experience that during routine collection of medical history participants often questioned the need for those questions, and generally required a lot of reassurance about why this information was being elicited. In general, participants appeared to lack familiarity of confidentiality principles, and despite being informed of these, they still appeared sceptical. For example, a group of participants from the current study had gathered in one participant's home, and although each were assessed separately, at the conclusion of the assessments the examiner was questioned in front of all the participants how they had performed in comparison to each other. It was reiterated that

due to privacy issues that information could only be discussed individually. To the examiner's surprise the participants then congratulated the examiner for "keeping her word", and then appeared to be more at ease. Hence, it is important not to pathologise distrust of unfamiliar processes and cultural differences in interaction styles. It is likely that this distrust of the assessment process is due to the lack of familiarity of being assessed, and due to this it is possible that in a clinical setting GA may be less inclined to divulge personal information which can in turn make the assessment and diagnostic process more difficult.

GA participants appeared to have difficulty understanding the concept of cognitive assessment and often expressed surprise (and disbelief) that such a process could be useful in a medical context (such as in the diagnosis of dementia) or that the assessment could accurately reflect their everyday functioning. At best, participants reported that they thought the questions were meaningless, that it was an invalid assessment of their thinking skills and participated purely on the basis that they wanted to assist the GA examiner complete educational requirements. At worst, participants became irritated during this process. For instance, during the administration of cognitive tasks a participant became extremely irritated at being asked to answer questions that he thought were beneath his social status in the GA community (for instance, naming as many animals as possible in one minute, and copying designs). The participant stated that the questions were childish and that he was insulted by being asked to participate in an assessment process that assessed children's scholastic capabilities. Due discomfort experienced from having difficulty with educationally based tasks (that to him initially

appeared trivial in nature) he stated that he could not accept that such tasks could relate to actual life achievement and functioning. Due to this the assessment was discontinued. Given that participants generally did not consider cognitive assessment to be a meaningful exercise, but were participating for philanthropic reasons, raises the possibility that in a clinical setting GA are less likely to be motivated or agreeable to participating or giving their best effort during a cognitive assessment.

As most participants lacked familiarity with testing procedures, concepts, and as tasks assumed a level of educational experience that many participants lacked, it was this author's experience that establishing rapport prior to assessment was extremely important. Of note, most participants were sensitive to their lack of education, as this is something that they highly valued, and were anxious to not appear cognitively impaired because of their low level of literacy. Participants appeared embarrassed at not being able to do simple education based tasks such as counting, and often commented that their grandchildren could complete such tasks effortlessly. They often commented during pen and paper tasks that it had been a long time since they had held a pen/pencil for any of their daily activities. They also often apologised for their poor writing, spelling, drawing, and poor arithmetic skills. Participants also stated that they did not have the opportunity to learn such skills when they were young. Participant comments reflected a sense of lost potential and a lost opportunity of gaining skilled employment.

GA cultural differences in clinical interview participation, attitudes and beliefs regarding assessment, lack of familiarity of assessment processes, and lack of understanding of test

concepts raise significant questions regarding the appropriateness of applying such tests in this group, as well as questions regarding the validity of assessment findings. Given the observed GA cultural differences during assessment the risk of diagnostic inaccuracy in assessment of GA cognitive functioning is discussed in the following section.

4.4 Risk of Diagnostic Inaccuracy in GA

Given the findings of the present study, CAMCOG and MMSE norms from Greece are not considered to be applicable to GA as these norms could result in false positives, that is healthy GA could be inaccurately diagnosed as impaired according to Gn norms. Tsolaki, Fountoulakis, Chantzi, and Kazis (2000) developed CAMCOG norms for individuals less than 74 years of age and for individuals greater than 75 years of age. Given that the majority of GA participants fell within the less than and equal to 74 years of age category an example regarding the possibility of misdiagnosing GA from this age group will be highlighted.

Approximately 50% of the GA sample (below 74 years of age) had CAMCOG scores lower than the Gn cut off score of 73/74 total CAMCOG points for detecting dementia. In terms of gender differences for GA participants below 74 years of age, approximately 65% of female GA participants and 17% of male GA participants scored below the Gn cut off score of 73/74. Interestingly, if the original cut off score of 79/80 were applied to all of the GA participants, as has been applied to Australian CALDI and mainstream memory clinic clients (Clarnette, Almeida, Forstil, Paton, & Martins, 2001; LoGiudice, Hassett, Cook, Flicker, & Ames, 2001), approximately 72% of GA participants would be

classified as impaired. In terms of gender differences for GA participants approximately 80% of female GA participants and 46% of male GA participants scored below the original CAMCOG cut off score of 79/80.

In regards to MMSE cut off scores Fountoulakis, Tsolaki, Chantzi, and Kazis (2000) recommended a general MMSE cut-off score of 23/24 for Gn which is in keeping with the original recommended cut off score (Folstein, Folstein, & McHugh, 1975). Approximately 35% of the overall GA sample had MMSE scores lower than the recommended, Gn and mainstream, cut off score for detecting impairment. Approximately 54% of female GA participants and 24% of male GA participants scored below the MMSE cut off score of 23/24.

Given the risk of diagnostic inaccuracy when applying mainstream, western and Greek norms to GA performance on tests of cognition, the following section discusses how the CAMCOG and MMSE can still be usefully utilised with GA.

4.4.1 Discussion of the Utility of the CAMCOG and MMSE with GA

Although GA performed significantly lower than Gn on the CAMCOG and MMSE, supplementary post hoc analyses indicated that the CAMCOG and MMSE are useful screening tools for detecting cognitive impairment in GA, as GA obtained significantly higher scores than Greek nationals with dementia (GD).

Nevertheless, further investigation is warranted in this area by replicating findings and investigating whether this pattern of performance between migrant groups and groups from country of origin occurs in other CALD groups in Australia. Current findings also indicated that new cut off scores will need to be developed for detecting impairment in GA with the CAMCOG and MMSE. Given that in clinical settings where patients presenting with early dementia are common and often represent a diagnostic dilemma, the practical value of a screening test for dementia is its utility in early detection of this condition. Hence cognitive screening instruments need to have acceptable sensitivity so that individuals with impaired cognition can be identified and appropriately managed. However, instruments must also have acceptable specificity so that individuals are not incorrectly diagnosed as having dementia (Frank & Byrne, 2000).

Ideally, new cut off scores would be developed by comparing healthy GA to demented GA and examining the most appropriate score in terms of its specificity and sensitivity, however this was beyond the scope of the current study. However, an approximate guide until such research has been conducted is to consider modifying Gn cut off scores based on the difference of means between the two groups. As there was a significant difference between females and males on CAMCOG performance and that overall GA females scored an average 17 points lower than Gn females, and GA males scored an average 8 points lower than Gn males on the CAMCOG. The cut off score for GA could be adjusted at approximately 55 to 56 points for females, and at approximately 65 to 66 points for males. In addition, given that GA participants scored an average of 3 points lower than

On participants on the MMSE, the cut off score for GA could be adjusted to approximately 20/21.

The current study findings support the view that if tests are not standardised and norms not obtained not only for different age ranges and different educational levels, but also for cultural groups there is a risk that what is normal for one group might be interpreted as pathological for another (Ardila, 1995). Whether the tests included in the current study actually measure the intended cognitive functions in GA and CALD groups in general remains an unanswered question. Nevertheless, the clinical neuropsychologist can be aided by these estimated changes to the cut off scores to more accurately determine whether acquired cognitive dysfunction is present when assessing GA and potentially similar clients. The following section outlines some additional recommendations for a culture centered practice that may be helpful in improving diagnostic accuracy in cross cultural assessments and research.

4.5 Implications and Practical Recommendations for Culture Centered Practice

Cross cultural researchers encourage psychologists to be flexible when assessing cognitive functioning in CALDI and that they consider the specific circumstances of each client due to the heterogeneity of CALDI. It is proposed that, in general, country of residence norms (that is western mainstream test norms) may be more appropriate in acculturated clients with fluent English that are from a relatively higher educational or occupational background rather than CALDI with low levels of literacy. It is recommended that the client's level of acculturation and the effect this level might have

on cognitive test performance is clearly acknowledged (Olmedo, 1981; Lopez & Taussig, 1991).

Berry's (1993) ecological approach to understanding cognition across cultures highlights that the concept of culture is a dynamic one, where acculturation and other ecological factors interact to influence observable behaviours and inferred characteristics. In many ways older GA represent a cultural subgroup of GN due to their continuation of traditional Greek values blended with their migrant experience. However, it is important to note that there are individual variations within this group, in that some GA may have been able to maintain their Greek language fluency and access to mass media for instance by virtue of their employment, for instance male GA. Conversely, some GA may have had the opportunity to improve their fluency in English and may be more comfortable communicating in English rather than Greek. Awareness of such variations is important in terms of tailoring the assessment process to assist with diagnostic accuracy.

Given that subsequent generations of GA have completed their formal schooling in Australia and are proficient in English it is likely that they would have learned the attributes which are assessed by Western cognitive measures, and hence Western tests may be generally appropriate for assessing subsequent generations of GA. However, given their bicultural heritage and cultural influence from previous GA generations it is likely that some differences, for instance in interaction styles, would be noted in comparison to individuals from the host culture. For example, Greeks tend to enjoy discussing differing viewpoints to the extent that they may discourse just for the

enjoyment of discourse rather than to achieve a conclusion on a topic per se. They can also become fairly animated and may not adhere to conversational turn taking rules. Additionally, Greeks tend to be uncomfortable when interacting in an impersonal manner and may appear to be overly familiar when trying to establish rapport.

Although current methods and tests utilised in assessment of mainstream individuals may be appropriate when utilised with subsequent generations of GA. However, given Australia's cultural diversity and diagnostic accuracy issues identified by the present study, the application of current methods, tests and norms to older GA (and other CALDI) is likely to require clarification with future studies. Hence, cut off scores from tests normed in other countries may need to be investigated prior to being applied in migrant groups in Australia.

Ardila (1995) argued that native well-trained members from the cultural group in question should conduct cross cultural assessments as our own cultural experience mitigates our ability to be objective about what is relevant and appropriate in another culture. For instance, English speaking clinicians may not be aware whether the CALDI has been educated with a rote learning style or with an analytical problem solving style. English speaking clinicians may also not be able to ascertain whether test content, in particular in the areas of history and literature are suitable for the client's type of education. Also they may not be aware of what are and are not acceptable standards of behaviour in a different cultural group. Unfortunately at this point in time there simply are not enough CALD neuropsychologists that have the knowledge or the means, to

develop, norm, interpret, and administer tests appropriate to their culture. In addition, given that it would be inequitable for English speaking neuropsychologists to withhold neuropsychological service from CALD clients, in the interim a culture centered approach needs to be considered.

The American Psychological Association (APA, 2002) developed guidelines on multicultural practice for psychologists, which emphasise the need for a culture centered approach. The guidelines state that in culture centered practice, psychologists recognize that all individuals, including themselves, are influenced by different contexts and that behaviour may be shaped by culture. The guidelines indicate that cultural experience may be manifested in the expression of different belief systems and value sets among clients and across age cohorts. Culture centered assessment strategies include respecting the client's boundaries by not using interpreters who are family members, authorities in the community, or unskilled in the area of psychological practice (APA, 2002). As well as, being aware of the limitations of standardized assessment instruments and diagnostic methods (Constantine, 1998; Helms, 2002; Ridley, Hill, & Li, 1998, Ivey & Ivey, 1998; Sue, 1998. Culture centered psychologists are also encouraged to have knowledge of a test's reference population and possible limitations and reduced validity of the instrument with other populations. When using standardized assessment tools and methods, culture centered practitioners are instructed to exercise critical judgment (Sandoval, Frisby, Geisinger, Scheuneman, & Ramos–Grenier, 1998). Culture centered psychologists are also encouraged to focus on the validity of measures due to issues related to test bias, test fairness, and culturally relevant and equivalent test constructs (APA, 1992; Arredondo,

1999; Arredondo et al., 1996; Dana, 1998; Grieger & Ponterotto, 1995; Lopez, 1989; Paniagua, 1994, 1998; Ponterotto, Casas, Suzuki, & Alexander, 1995; Samuda et al., 1998).

Ardila (1995) argues that as our own cultural experience mitigates our objectivity regarding what is culturally relevant in another culture, that CALD practitioners should always be consulted if assessing a CALDI. Before formulating a diagnosis consultation with another professional who comes from the same culture as the client, or who has expert knowledge of the client's culture, is considered a key component in a culture centered practice. It is argued that this quality check concerning the plausibility of the findings and recommendations provides a more unbiased and accurate assessment (Samuda et al., 1998).

Cross cultural researchers also recommend ascertaining the client's beliefs regarding testing processes and what prior experience they have had with testing (Ponterotto, Casas, Suzuki, & Alexander, 1995). For instance, they may not be motivated to perform to the best of their ability if they believe that the tests are socially or culturally biased. It has also been reported that culturally diverse clients exhibit more anxiety during a test situation, than mainstream clients, due to the unfamiliarity of the task. To lessen the impact of this anxiety, it is recommended that the assessor takes time, albeit longer than usual, to establish rapport and describe any assessment expectations to the client (Samuda et al., 1998).

Furthermore, where possible allow the client to complete practice items to improve familiarity with assessment, task comprehension, task solution and test-wisenes. It is thought that practice improves awareness regarding the need to balance speed and accuracy during testing (Nell, 2000). In addition, clinical judgment is particularly important in culturally centered practice. For instance, a neuropsychologist provided an interesting example of an Italian client's approach to a psychomotor task. When the task was administered with the standardised test instructions the client's approach was very slow, which was in contrast to what had been observed clinically. When the clinician changed the instructions so that they were culturally relevant, for instance the clinician asked to client to imagine that in order to have dinner ready before the family arrived home that the client needed to complete the task as quickly as possible, this led to a significant improvement in psychomotor speed.

Although claiming that nonverbal tests are culture free is likely to be an erroneous assumption because the examinee may be relying on internal language dialogue to solve the problems presented, as well as that this claim assumes that culture does not mediate task familiarity (Sodowsky, Gonzalez, & Kuo-Jackson 1998; cited in Samuda et. al., 1998) when assessing CALDI it is appropriate to add 'culture-reduced' tests in the assessment processes. Jensen (1980; cited in Ardila, 1995) proposed some criteria to reduce culture loading in psychological tests. Given that language tests are more sensitive to educational differences (Ardila, Ostrosky-Solis, Rosselli, & Gomez, 2000) in order to reduce the cultural loading of assessment a testing session should include Performance tests (instead of paper and pencil tasks), oral instructions (instead of written instructions),

pictorial (instead of written), oral responses (instead of written responses), slower tests (instead of speed tests), nonverbal content (instead of verbal content), nonscholastic skills (such as procedural memory testing instead of recall of past-learned information), and solving everyday problems (instead of decontextualised abstract reasoning or specific factual knowledge reasoning which are skills taught during formal schooling).

In regard to the diagnosis of dementia quite often, CALDI particularly those with low education levels have tended to work in areas where they were required to execute manual activities, such as farming, handcrafting and manual labour. Given that in AD procedural memory (how to do things) is usually better preserved than declarative memory (awareness of memories), when assessing AD in manual labourers, it is recommended that procedural memory testing is included, and/or scales assessing the ability to perform lifelong procedural working activities (Ardila, Ostrosky-Solis, Rosselli, and Gomez, 2000).

Similarly, as standardised tests do not sample all forms of intelligence (Neisser, 1996) it is recommended that consideration be given to everyday cognition or contextualised cognition as this approach attempts to study cognition within the individual's sociocultural context. Well defined assessments of everyday cognition are considered to include every day problems that are likely to have only a single correct answer, and the inability to produce one correct answer could have serious maladaptive consequences (Allaire & Marsiske, 2002). However, research on everyday cognition, or culturally relevant cognition, is a relatively new field of enquiry. Until further research can

elucidate the common threads of everyday cognition across situations modified standardized tests of cognition are still considered to offer the best means possible of assessing and diagnosing cognitive impairment in CALDI. However, it is emphasized that a single test score must never be used to diagnose a CALDI, instead a comprehensive approach must always be used (Segall, Dasen, Berry, & Poortinga, 1999).

In addition, assessment of cognitive decline in an older migrant needs to include clinical interview, observations, the reports of significant others, and a formal assessment of adaptive functioning. A formal assessment of adaptive functioning refers to criteria such as those identified in the DSM or by the National Institute of Neurological and Communicative Disorders and Stroke-Alzheimer's Disease and Related Disorders Association. A recent report revealed that a formal assessment of adaptive functioning is conducted by fewer than half of clinical psychologists providing neuropsychological assessment (Dammers et al., 1995). Formal assessment of adaptive functioning assists the culturally sensitive psychologist in determining whether cognitive test data reflect the person's actual level of functioning or possible test bias (Olmedo, 1981; Lopez & Taussig, 1991). Moreover, as many researchers have noted, decisions about actual cognitive decline (as used in dementia classification) ultimately require serial assessments where a screening test can be used to document cognitive changes over time (Shulman, 2000). Hence, reserving a formal diagnostic judgment until a review assessment has been conducted to determine the stability of the client's cognitive functioning may assist in improving diagnostic accuracy in CALDI.

Psychologists are becoming increasingly aware that a CALDI assessed by cognitive tests developed and normed by Western and educated societies may demonstrate a pattern of “impairments” that has more to do with the cultural bias of the tests rather than a cognitive disorder per se (Ogden, 2001). However, Artiola i Fortuny (2004) argues that most clinicians lack awareness regarding cross cultural issues. Anecdotal evidence from personal experiences within clinical health settings suggest that in general clinicians’ awareness regarding cross cultural issues may only be at a superficial level (i.e., at best the awareness that an interpreter is required when assessing CALDI). Hence, it is this author’s opinion that education regarding culture centered practice needs to be systematically provided to health professionals in order to improve diagnostic accuracy and avoid inappropriate treatment and outcome of CALDI.

4.6 Methodological Issues

Methodological differences that may possibly have influenced the findings of the current study include differences in recruitment of participants and changes to test items. Overseas researchers (Tsolaki, Fountoulakis, Chantzi, & Kazis, 2000; and Fountoulakis, Tsolaki, Chantzi & Kazis, 2000) developed norms for the CAMCOG and MMSE based on a combined sample consisting of healthy relatives of dementia patients and of non-demented outpatients with a range of reportedly mild cognitive symptomatology due to various neurological and psychiatric conditions (such as stroke and depression). The overseas researchers argued that participants with mild cognitive symptomatology were included in their studies in order to represent the diverse population presenting at a memory clinic or in the second phase of a community study. However, given the possible

confounding effects of neurological and psychiatric conditions on cognitive performance the present study excluded participants with such conditions from recruitment and purposely sought healthy, socially active, community dwelling individuals. Researchers have suggested that failure to exclude preclinical dementia can make norms less sensitive to detecting dementia by underestimating the mean and overestimating the variance and effect of age (Sliwinski, Lipton, Buschke & Stewart, 1996; Marcopulos & McLain, 2003). Although a number of precautions were taken to exclude participants with possible cognitive difficulties, given that GA participants were not independently assessed it is possible that some of the participants may have been experiencing cognitive changes. However, this was considered to be unlikely in the majority of cases as GA participants were socially active and their responses on the GDS indicated minimal depressive symptomatology, below the recommended cut off point for detecting depression in the elderly Greek population. In addition, it seems unlikely that the current study would have sampled so many cognitive impaired individuals given that base rates of dementia of approximately 5% (Anthony & Aboraya, 1992) as well as the careful screening during the clinical interview process for healthy and independently functioning participants.

Furthermore, given that the current study was specifically interested in cognitive differences between healthy Gn and GA, it was decided to compare these samples, rather than use the combined sample of Gn and GID as was conducted in the overseas studies. Interestingly, although GID participants obtained slightly higher scores than GA participants on CAMCOG and MMSE this difference was not significant. As such, GID and GA performed comparably on CAMCOG and MMSE. This raises the possibility that

if the overseas cut off scores were developed only with the Gn participants, this may lead to a higher cut off score, and a greater number of GA participants being classed as impaired. Additional participant differences include that the overseas researchers excluded illiterate participants from their studies, whereas the current study included two participants with little to no education, however, it is unlikely that these participants performance would account for group differences. Although in both studies the CAMCOG and MMSE were administered in Greek, some items were changed for administration of these tests with the GA participants. However, the item changes were minimal, and contained information more relevant and familiar to GA and therefore would be considered easier for GA to obtain a correct answer. Overall, these methodological differences between the current and overseas Greek studies are considered to have made a negligible contribution to difference in performance by Gn and GA.

4.7 Strengths and Limitations of the Present Study

Despite GA limited understanding of cognitive functioning research, clinical interview, and attitude differences regarding test participation, the current study was able to recruit a sufficient number of healthy community dwelling participants to conduct the required statistical analysis. However, this study was somewhat limited by the way in which education level was measured and lack of formal measure of acculturation.

Cross cultural researchers have indicated that reported years of education may not be an accurate measure of educational achievement. This is due to differences in the quality of

education owing to disrupted schooling, as well as, different teaching techniques. It has also been noted that literacy abilities are acquired and maintained by individuals whilst participating in socially organised activities with written language and that therefore individual literacy is dependent upon social literacy (Scribner, 1984). Similarly, given that fluency is a skill that requires exposure and constant practice it has been argued that even individuals with high levels of linguistic skill can, without realising it, lose a measure of fluency in their native tongue through a natural assimilation process that takes place in the new country of residence (Artiola i Fortuny, 2004). Therefore, although Gn and GA may have reported that they attained the same number of years of education, Gn would have had more opportunity to maintain their acquired level of literacy in comparison to GA. In addition, level of literacy and numeracy, rather than reported years of education, are considered the best indicators of actual level of education. Hence, in addition to reported years of education a limitation of the current study was that literacy and numeracy levels were not identified in order to ascertain whether participants reported years of education correlated with actual literacy and numeracy skills.

Understanding the level of acculturation of the individual is also important as culture impacts on problem solving strategies and familiarity with test formats (Suzuki, Meller, & Ponterotto, 1996). GA participants level of acculturation can be informally inferred by their age, generational status, and self reported Greek and English level of fluency. However, a formal assessment tool may have been useful to quantify the degree of interaction with the Australian culture versus social involvement with members of the Greek culture (Dana, 1993; Ponterotto & Casas, 1991).

4.8 Future Research Directions

As with any new finding, current study findings have raised many more questions than what the study was originally developed to investigate. Berry (1993) stated that at the present time we have perhaps achieved an indigenous psychology in a few (mainly Western) cultures, and we may have achieved some degree of comprehensive knowledge about a few areas of cognitive functioning across a range of cultures (that is a universal for the particular cognitive function), but we have clearly not achieved a fully universal cognitive psychology. Although language competency is important in assessment for the reasons outlined previously, however, without the appropriate diagnostic tools, language competency may only be able to provide the clinician with a picture of the patient but will not provide the clinician an objective means by which to diagnose the patient's difficulties (Artiola & Mullaney, 1998). Current study findings underscore the need for well-designed studies examining the effects of the migrant experience on cognitive and psychological functioning among GA and other CALD groups (Marcopulos, McLain & Giuliano, 1997). In particular, the literature lacks studies examining the validity of neuropsychological tests to diagnose pathological cognitive decline in GA. Current study findings indicate that the application of cut-off scores based on normative data derived from culturally different, higher functioning subjects, or from peers from country of origin, is likely to contribute to over diagnosis of cognitive dysfunction, excessive referral for more expensive and invasive neuromedical procedures, and unnecessarily restrictive treatment or placement service recommendation (Marcopulos, McLain & Giuliano, 1997). Hence, in order to improve diagnostic accuracy in GA and other migrant

groups future research needs to be directed towards validating whether test norms from the country of origin are applicable to migrant groups.

In addition to the normalisation of current basic neuropsychological instruments in different cultural contexts cross cultural researchers highlight that cross cultural neuropsychology is in need of addressing several key focal points of neglected research, including the development of new neuropsychological instruments appropriate for different cultural contexts. That is, not only translating tests but adapting or redeveloping tests with culturally relevant tasks that assess the level of functioning in that particular culture's cognitive style. Further areas of future research include; the analysis of educational factors and subcultural variations in relation to test performance; the analysis of cognitive disturbances in cases of brain pathology in different cultural and educational contexts; the investigation of commonality in neuropsychological performance among CALD groups; and the analysis of CALDI organisation of cognitive abilities (Ardila, 1995; Manly & Jacobs, 2002; Kim, 2000).

4.9 Conclusion

Given that “we are still far from a scientific understanding of the manner in which people from different cultures process the same information” (Kendall et al., 1988, p. 328 cited in Nell, 2000, p. 56) norms for performance in a sufficiently broad array of neuropsychological tests and an extended analysis of cognitive disturbances in different cultural and ecological contexts are necessary for us to understand and serve the neuropsychological needs of all of our clients (Ardila, 1995). The combination of cultural

differences in clinical interview participation, attitudes, beliefs and test taking behaviours, lack of materials in languages other than English and lack of normative information for populations with low levels of education and migrant groups renders neuropsychological assessment quite challenging (Artiola i Fortuny, 2004). Although some researchers argue that neuropsychology has been slow to recognize the need for culturally sensitive assessment (Nell, 1999). It is hoped that by investigating the differential impact of historical, economic, and sociopolitical forces on individuals' behaviour and perceptions, that psychology will continue to develop a deeper knowledge and awareness of race and ethnicity in psychological constructs (APA, 2002). It is anticipated that, with this increased knowledge base and effectiveness of applications that culture centered psychological practice will continue to evolve.

The movement toward culturally skillful assessment is based on the notion that no existing standardised tests are culture-free, but are rather culture-reduced. Any test designed and developed for use by mainstream, middle-class individuals will have information, language, or format biases. These tests may also have structural characteristics that require cognitive processes unfamiliar to some cultures. Thus, several methods for using existing assessment instruments have been suggested. Assessors of the culturally diverse individuals have an ethical and professional obligation to ensure that every effort has been made to make the assessment process as culture-free as possible by (a) developing a philosophy that a low score may be attributable to cultural difference rather than a deficit; (b) adopting practices designed to use tests in such a way as to maximize their validity; (c) realising that assessment practices require not just sensitivity

and knowledge of a client's cultural background, but also the skill to ascertain the impact of this background on test performance; (d) committing to change traditional modes of assessment; and (e) using existing measures of cognitive ability in culturally appropriate ways.

Cognitive test performance differences between GA and Gn are thought to be due to different socialization experiences, different exposure to Greek, differences in GA ability to maintain linguistic skills, and due to acculturation factors from exposure to the Australian culture. In conclusion, the present study represents an effort to provide clinicians with data designed to assist in the clinical decision making process by improving the psychometric characterisation of performances by Hellenic diaspora when utilising the CAMCOG and MMSE. Further work in this area focusing on expanding the normative data available for use with GA is essential as a first step in addressing the need for appropriate neuropsychological methods for use with GA.

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Appendix A

Γενικές πληροφορίες- background information

TIME.....

	ΕΡΩΤΗΣΗ			H/Y στήλη
1.	Κωδικός ασθενούς (survey #) Όνοματεπώνυμο (name) Διεύθυνση/Post Code (address)			(1-5)
	Κράτος γεννήσεως (country of birth)			(6-12)
	ημερομηνία εισόδου στην Αυστραλία (date of entry in Australia)			(13-18)
2.	Ημερομηνία συνεντεύξεως (date of interview)			(20-25)
3.	Όνοματεπώνυμο Εξεταστού (name of interviewer)			(26-27)
4.	Εξεταστικό Κέντρο (study site)	1 participants home 2 other		(28)
5.	Ημερομηνία γεννήσεως (DOB)			(30-35)
6.	Ηλικία κατά την συνέντευξη (age)			(36-38)
7.	Φύλο (sex)			
	(male)		άρρεν 1	
	(female)		θήλυ 2	(39)
8.	Οικογενειακή κατάσταση (τωρινή) (current marital status)	(single)	ανύπανδρος-η 1	
	(married)		παντρεμένος-η 2	
	(divorced)		διαζευγμένος-η 3	
	(separated)		σε διάσταση 4	
	(widowed)		χήρος-α 5	(40)
9.	Κυρία Απασχόληση (καταγράψτε ακριβώς τη φύση της εργασίας) (main occupation – precise nature of job)			(41)

Column 42-44 code as 9, 99 or 999

ΚΑΤΑΓΡΑΨΤΕ ΤΟ ΧΡΟΝΟ ΕΝΑΡΞΗΣ ΤΗΣ ΣΥΝΕΝΤΕΥΞΗΣ (45-48)

Rating of spoken skills

Greek	English
poor moderate good	poor moderate good

Section A:

Interview with participant

Each question should be asked as written, although additional probing may sometimes be necessary to clarify inadequate answers.

Note that sub-headings are not intended to relate to specific diagnostic entities.

ALL ITEMS MUST BE CODED

CODING:

δεν ξέρω/δεν απαντώ.....8 , 88 ή 888

δεν έγινε η ερώτηση/ not applicable...9 , 99 ή 999

ΤΜΗΜΑ Ι. Ερωτήσεις αφορούσες την παρούσα κατάσταση.

(present state)

13. Ποιο είναι το όνομά σας; λάθος 0 8 (49)

omit

14. Πόσων ετών ήσασταν στα τελευταία σας γενέθλια λάθος 0 8 (50)

15. Ποιά είναι η ημερομηνία γεννήσεώς σας; λάθος 0 8 (51)

omit

εάν η ηλικία δε συμφωνεί ακριβώς με την ημερομηνία και φαίνεται να αναφέρεται στα επόμενα γενέθλια, να διευκρινιστεί με περαιτέρω ερωτήσεις. **(if referring to next b'day clarify by further qns)**

[ΠΡΟΧΩΡΗΣΤΕ ΣΤΗΝ ΕΞΕΤΑΣΗ ΤΩΝ ΓΝΩΣΤΙΚΩΝ ΛΕΙΤΟΥΡΓΙΩΝ ΕΑΝ ΔΥΟ

ΑΠΟ ΤΙΣ ΠΑΡΑΠΑΝΩ ΕΡΩΤΗΣΕΙΣ ΑΠΑΝΤΗΘΟΥΝ ΛΑΘΟΣ.]

[if any 2 of the above are wrong skip to Section B]

16. Πόσων ετών ήσαστε όταν έτη ... 88 (52-
τελειώσατε το σχολείο; (years) 99 53)

17. κάνατε παραπάνω Έτη 88 (54-
(years) ... 99 55)

Τύχατε περαιτέρω επιμόρφωσης ή (none) 00
εκπαίδευσης μετά το σχολείο;

(Πανεπιστήμιο, Τεχνική Σχολή ή άλλο)

Αν ναι, πόσα χρόνια;
Apprentiship vs work experience

καθορίστε: διαιρέστε δια δύο ή με
άλλο κατάλληλο αριθμό για
εκπαίδευση part-time
(divide by 2 for part time)

18. Πού ζείτε τώρα; νοσοκομείο χρονίων 0 8 (56)
παθήσεων 1 9

οίκο ευγηρίας 2

σε ιδιωτικό χώρο- 3

εξαρτημένος 4

άσυλο 5

με τον/την σύζυγο ανεξάρτητοι 6

με συγγενείς/φίλους ανεξάρτητος

μόνος και ανεξάρτητος

Λειτουργία των αγγείων του εγκεφάλου - cerebrovascular function

Τώρα θα ήθελα να σας κάνω μερικές ερωτήσεις για την υγεία σας [και για οτιδήποτε προβλήματα σχετικά μ' αυτήν].

- | | | | |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------|------------|------|
| 19. Έχετε συχνά πονοκεφάλους;
(οποιοδήποτε είδους) | όχι ή σπάνια
> από μία φορά εβδομαδιαίως. | 0 8
1 9 | (57) |
| 20. Αισθάνεστε συχνά ζαλάδες; | όχι ή σπάνια
> από μία φορά εβδομαδιαίως | 0 8
1 9 | (58) |
| 21. Αισθάνεστε αστάθεια/μια τάση να πέσετε κάτω;
(tendency to fall?) | όχι ή σπάνια
> από μία φορά εβδομαδιαίως | 0 8
1 9 | (59) |
| 22. Είχατε ποτέ αδυναμία, δυσκολία με την ομιλία, τη μνήμη ή την όρασή σας η οποία υποχώρησε;
(difficulty with speech, memory, vision, which got better?) | όχι
ναι | 0 8
1 9 | (60) |

Ύπνος - sleep

- | | | | |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------|-----------------|------|
| 23. Είχατε τώρα τελευταία δυσκολία να σας πάρει ο ύπνος; | όχι
ναι | 0 8
1 9 | (61) |
| 24. Κάνετε τώρα τελευταία ανήσυχο ύπνο (ή) ξυπνάτε πολλές φορές κατά τη διάρκεια της νύχτας;
(not due to physical problems) | όχι
ναι | 0 8
1 9 | (62) |
| 25. Έχει αλλάξει ο τύπος του ύπνου σας ώστε να ξυπνάτε νωρίς το πρωί και να μη μπορείτε να ξανακοιμηθείτε;
(or sleep παραπάνω?)
(code early morning waking if 2 hrs earlier than usual) | όχι
μερικές φορές
τις περισσότερες φορές
(τουλάχιστον 2 ώρες νωρίτερα από το σύνηθες) | 0
1 8
2 9 | (63) |

Καταθλιπτική διάθεση – depressed mood

26. Έχετε χάσει τη διάθεσή σας για φαγητό ή τρώτε πολύ περισσότερο απ' ότι συνήθως;	όχι 0 μερικές φορές 1 8 τις περισσότερες φορές 2 9 (64)
27. Έχετε χάσει ή βάλει κιλά τους τελευταίους έξι μήνες; (specify)	όχι 0 μικρή αλλαγή 1 8 μεγάλη αλλαγή 2 9 (65)
28. Αισθάνεστε συχνά έλλειψη δραστηριότητα η αδυναμία να κάνετε τις υποχρεώσεις σας? (less confident/able to cope) αυτοπεποίθησης ή αδυναμία να ανταποκριθείτε στις υποχρεώσεις σας;	όχι 0 8 ναι 1 9 (66)
29. Αισθάνεστε μεγαλύτερη δυσκολία να πάρετε αποφάσεις απ' ότι παλαιότερα;	όχι 0 8 ναι 1 9 (67)
30. Έχετε χάσει το ενδιαφέρον σας ή την ευχαρίστηση σχετικά με πράγματα που κάνατε παλαιότερα;	όχι 0 μερικές φορές 1 8 τις περισσότερες φορές 2 9 (68)
31. Αισθάνεστε ότι τώρα τελευταία έχετε χάσει την ενεργητικότητά σας και είναι δυσκολότερο για σας να κάνετε ακόμα και απλά πράγματα;	όχι 0 8 ναι 1 9 (69)
32. Προτιμάτε να μένετε μόνο/η/ς σας τώρα τελευταία;	όχι 0 8 ναι 1 9 (70)
33. Βρίσκετε πιο δύσκολο το να συγκεντρωθείτε τελευταία;	όχι 0 8 ναι 1 9 (71)
34. Αισθάνεστε ότι μιλάτε πιο αργά από το συνηθισμένο για σας;	όχι 0 8 ναι 1 9 (72)
35. Υπάρχουν στιγμές που η σκέψη σας είναι πολύ πιο αργή απ' ότι συνήθως;	όχι 0 8 ναι 1 9 (73)
36. Αισθάνεστε καθόλου λύπη ή απελπισία; (sad or miserable?)	όχι 0 μερικές φορές 1 8 τις περισσότερες φορές 2 9 (74)

αν δεν εμφανίζονται καταθλιπτικά στοιχεία , παραλείψτε τις ερωτήσεις 37-42 και κωδικοποιήστε 999 ή 9 (if not depressed skip qns 37-42, code 9)

37. Πόσο καιρό αισθάνεστε έτσι; (κωδικοποιήστε την απάντηση "πάντα" (always)ως 998)	διάρκεια (μήνες)	.....	888 999 (75-77)
38. Υπάρχει κανένας λόγος εξαιτίας του οποίου αισθάνεστε στενοχώρια; αν "ναι" καθορίστε (specify if yes) 01 επαναλάβετε τα αντικείμενα 1-5 (repeat col. 1-5)	όχι απώλεια/θάνατος άλλο	0 1 2	8 9 (78) (79-80)
39. Η στεναχώρια αυτή είναι "διαφορετική" από το συνηθισμένο σας αίσθημα λύπης; (different from usual feeling of sadness?)	όχι ναι	0 1	8 9 (6)
40. Όταν είστε λυπημένος μπορεί τίποτα να σας χαροποιήσει; (anything to cheer up?)	όχι ναι	0 1	8 9 (7)
41. Υπάρχει κάποια ιδιαίτερη ώρα της ημέρας που αυτό είναι χειρότερο;	όχι ναι (για πρωί)	0 1	8 9 (8)
42. Μπορεί να ευθύνονται άλλοι άνθρωποι για τα προβλήματά σας; (blame others?)	όχι ναι	0 1	8 9 (9)
43. Αισθάνεστε άχρηστος ή ένοχος; Έχετε τύψεις για πράγματα ή πράξεις που κάνατε στο παρελθόν; (worthless or guilty?)	όχι μερικές φορές τις περισσότερες φορές	0 1 2	8 9 (10)
44. Πώς αισθάνεστε για το μέλλον σας;	αδιάφορα, θετικά απαισιόδοξα (χαρούμενος)	0 1	8 9 (11)
45. Αισθάνεστε μερικές φορές ότι η ζωή σας δεν έχει νόημα; Δεν αξίζει κανείς να ζει; αν "όχι" παραλείψτε την ερώτηση 46 και κωδικοποιήστε 9 (if no, skip qn 46)	όχι ναι	0 1	8 9 (12)
46. Έχετε αισθανθεί τόσο άσχημα που θα θέλατε να τελείωναν όλα; (αυτοκτονική διάθεση)	όχι μερικές φορές επίμονος ιδεασμός απόπειρα αυτοκτονίας	0 1 2 3	8 9 (13)

55. Έχετε δυσκολίες στις δουλειές του σπιτιού; οικιακές ασχολίες π.χ στο να φτιάξετε ένα φλιτζάνι καφέ; (household tasks)	όχι	0	
	ναι	1	8
	είναι αδύνατο	2	9 (24)
56. Έχετε δυσκολίες στο κατουρημα ή προς νερού σας; στον έλεγχο της ουροδόχου κύστεώς σας;	όχι	0	
	μερικές φορές βρέχεται	1	8
	συχνά βρέχεται	2	9 (25)
57. <u>In opinion of interviewer is failure due to physical impediment (eg stroke) as distinct from cognitive impairment?</u>	όχι σωματικό	0	8
	εν μέρει σωματικό (partly physical)	1	9 (26)
	εξ'ολοκλήρου σωματικό (entirely physical)	2	

If no impairment, score 9

Κατά τη γνώμη του εξεταστή είναι η ανεπάρκεια συνέπεια σωματικού προβλήματος π.χ εγκεφαλικό επεισόδιο, ρευματοειδής αρθρίτις ανεξάρτητου από την ανεπάρκεια των ανώτερων νοητικών λειτουργιών;

Μνήμη - memory

58. Έχετε καθόλου δυσκολίες με τη μνήμη σας;	όχι	0	8
	ναι	1	9 (27)
59. Ξεχνάτε το μέρος που αφήσατε πράγματα, περισσότερο από παλαιότερα;	όχι	0	8
	ναι	1	9 (28)
60. Ξεχνάτε τα ονόματα των στενών σας φίλων ή συγγενών;	όχι	0	8
	ναι	1	9 (29)
61. Έχετε ποτέ χαθεί στη γειτονιά σας;	όχι	0	8
	ναι	1	9 (30)

Αν δεν υπάρχει δυσκολία με τη μνήμη (ερωτ. 58-61) παραλείψτε τις ερωτήσεις 62-64 και κωδικοποιήστε 999 ή 9. **if no problem with memory, qn 58-61, skip qn 62-64 and code 9**

62. Πότε άρχισαν αυτές οι δυσκολίες;	διάρκεια σε μήνες	.....	888
			999 (31-33)
63. Η έναρξη ήταν ξαφνική; (come on suddenly)	σταδιακή	0	8
	αιφνίδια	1	9 (34)

64. Βελτιώθηκε ή επιδεινώθηκε από τότε που άρχισε; (has it become better or worse since it started?)	βελτιώθηκε	0	
	επιδεινώθηκε	1	8
	σταθερό	2	9 (35)

Γενική νοητική λειτουργία – general mental functioning

65. Μιλάτε η σκέφτεστε για το παρελθόν περισσότερο απ' ό τι για τα πρόσφατα γεγονότα; Έχετε την τάση να σκέφτεστε και να μιλάτε (tend to)	όχι	0	8
	ναι	1	9 (36)

66. Όταν μιλάτε αισθάνεστε δυσκολία στο να βρείτε τη λέξη που θέλετε (ή μερικές φορές χρησιμοποιείτε λάθος λέξη);	όχι	0	8
	ναι	1	9 (37)

*Αν δεν υπάρχει δυσλειτουργία (ερώτηση 66) _ παραλείψτε την ερώτηση 67 και κωδικοποιήστε 999
if no difficulty in qn 66 omit qn 67 and code 999*

67. Πόσον καιρό έχετε αυτά τα προβλήματα;	διάρκεια σε μήνες	.....	888
			999 (38-40)

Παρανοϊκά και άλλα ψυχωτικά στοιχεία – paranoid and other psychotic features

[Μερικές ερωτήσεις που αφορούν την φιλικότητα (friendliness) των γειτόνων και άλλων, είναι μια χρήσιμη εισαγωγή πριν κάνετε ερωτήσεις που σκοπεύουν να αποκαλύψουν σαφή (definite) ψυχοπαθολογία (pathology).]

Π.χ τα πάτε καλά με τους γείτονές σας ή έχετε δυσκολίες;

68. Είχατε ποτέ την εμπειρία να ακούσετε φωνές που άλλοι άνθρωποι δεν άκουγαν; (establish presence or absence of hallucinations and specify content)	όχι	0	8
	ναι	1	9 (41)
καθορίστε παρουσία ή απουσία παραισθήσεων και περιεχόμενο	διάρκεια σε μήνες	.....	888
			999 (42-44)

69. Είχατε ποτέ την εμπειρία του να δείτε διάφορα πράγματα που άλλοι άνθρωποι όχι; (establish presence or absence of hallucinations and specify content)	όχι	0	8
	ναι	1	9 (45)
	διάρκεια σε μήνες	.....	888
			999 (46-48)

70. Πιστεύατε ποτέ ότι οι άνθρωποι σας παρακολουθούν ή σας κατασκοπεύουν ή "σας σκάβουν το λάκκο";	όχι	0	8	
	ναι	1	9	(49)
	διάρκεια σε μήνες	.....	888	999 (50-52)
71. Έχετε ποτέ αισθανθεί ότι σας στέλνουν μηνύματα από την τηλεόραση, το ραδιόφωνο κτλ, ή ότι το σώμα σας ελέγχεται από κάτι ξένο;	όχι	0	8	
	ναι	1	9	(53)
	διάρκεια σε μήνες	.....	888	999 (54-56)
72. Νιώθετε τίποτε το περίεργο σχετικά με το σώμα σας; (establish presence or absence of hypochondrial or nihilistic delusions) <i>καθορίστε παρουσία ή απουσία υποχονδριακών ή μηδενιστικών παραληρητικών ιδεών</i> <i>Αν όχι παραλείψτε την ερώτηση 73 και κωδικοποιήστε 9</i> If no skip qn 73 and code 9	όχι	0	8	
	ναι	1	9	(57)
	διάρκεια σε μήνες	.....	888	999 (58-60)
73. Νιώσατε ποτέ σωματική ταλαιπωρία ή παρέμβαση; (bodily harassment or interference?) (establish presence or absence of illusory sexual or other interference) <i>καθορίστε παρουσία ή όχι παραληρητικών σεξουαλικών ή άλλων παρεμβάσεων</i>	όχι	0	8	
	ναι	1	9	(61)
	διάρκεια σε μήνες	.....	888	999 (62-64)

ΤΜΗΜΑ II: Ερωτήσεις που αφορούν το παλαιό ιστορικό – past history

Τώρα θα ήθελα να σας κάνω μερικές ερωτήσεις για την υγεία σας κατά το παρελθόν.

74. Είχατε ποτέ ή σας είπε ποτέ γιατρός ότι παρουσιάσατε - καρδιακή προσβολή, από την καρδιά; έμφραγμα; (heart attack)	όχι	0		
	ένα	1		
	δύο	2	8	
	>2	3	9	(65)
75. Είχατε ποτέ ή σας είπε ποτέ γιατρός ότι έχετε υπέρταση; - ψιλή πίεση από αίμα; - high blood pressure/hypertension	όχι	0	8	
	ναι	1	9	(66)

76. Σας είπε ποτέ κανείς γιατρός ότι έχετε εγκεφαλικό επεισόδιο; (stroke)	όχι	0		
	ένα	1		
	δύο	2	8	
	>2	3	9	(67)
77. Είχατε ποτέ σοβαρά χτυπήσει στο κεφάλι, ώστε να χάσετε για λίγο τις αισθήσεις σας; (καθορίστε ηλικία) (specify age/s)	όχι	0		
	ένα	1	8	
	δύο	2	9	(68)
	>2	3		
78. Παρουσιάσατε ποτέ σπασμούς; (καθορίστε ηλικία ενάρξεως) (fits , specify age of onset)	όχι	0		
	μόνο σε παιδική ηλικία	1		
	κατά το παρελθόν συνεχώς ως σήμερα	2	8	
		3	9	(69)
Τώρα θα ήθελα να σας ρωτήσω για τις συνήθειές σας σχετικά με το ποτό και το κάπνισμα.				
79. Καπνίζατε ποτέ πολύ, ας πούμε πάνω από 20 τσιγάρα την ημέρα για πάνω από ένα χρόνο;	όχι	0	8	
	ναι	1	9	(70)
80. Πίνετε ή πίνατε ποτέ αλκοολούχα ποτά όπως μύρα, κρασί ή τσίπουρο;	όχι	0	8	
	ναι	1	9	(71)
Πόσο πίνατε συνήθως; σημειώστε "ναι" για καθημερινή κατανάλωση 10 μονάδων επί χρόνο δύο εβδομάδων. (1 μονάδα=10 γραμ. αλκοόλ (περίπου 550 γραμ μύρας, 1 ποτήρι κρασί ή μια μερίδα τσίπουρο)				
81. Πιστεύετε ότι πίνατε πολύ; υπήρξατε ποτέ μεγάλος πότης;	όχι	0	8	
	ναι	1	9	(72)
82. Σας δημιούργησε ποτέ σοβαρά προβλήματα το ποτό όπως το να χάσετε τη δουλειά σας ή κατά την οδήγηση;	όχι	0	8	
	ναι	1	9	(73)
83. Παίρνατε ποτέ φάρμακα ή ναρκωτικά τα οποία δεν μπορούσατε να σταματήσετε, π.χ βαρβιτουρικά για να κοιμηθείτε ή αμφεταμίνες για να τα βγάλετε πέρα; (καθορίστε άλλα) (specify others)	όχι	0		
	ηρεμιστικά	1		
	υπνωτικά	2		
	βαρβιτουρικά	3		
	διεγερτικά	4	8	
	άλλα	5	9	(74)

84. Θεωρείτε τον εαυτό σας νευρικό άτομο;

καταγράψτε την απάντηση, record answer

όχι 0 8
ναι 1 9 (75)

85. Εμφανίσατε ποτέ κάποια ψυχική ή νευρολογική διαταραχή και χρειαστήκατε θεραπεία;

(καταγράψτε αριθμό επεισοδίων και άλλες σχετικές πληροφορίες)

emotional or nervous illness requiring treatment?

Record number of episodes

Record any relevant info

όχι 0
1 επεισόδιο 1
2 επεισόδια 2
3 επεισόδια 3
4 επεισόδια 4
5 επεισόδια 5
6 επεισόδια 6 8
>6 επεισόδια 7 9 (76)

Μείνατε καθόλου στο νοσοκομείο;

αν "ναι" καταγράψτε πότε και που

were you hospitalised?

When and where

όχι 0 8
ναι 1 9 (77)

(79-80)

02

ΤΜΗΜΑ ΙΙΙ: Ερωτήσεις που αφορούν το οικογενειακό ιστορικό - family history

Τώρα θα ήθελα να σας κάνω μερικές ερωτήσεις για την οικογένειά σας (repeat col. 1-5)

86. Πόσους γιους έχετε; (ζωντανούς ή νεκρούς)

αριθμός 88
κανένα 00 99 (6-7)

87. Πόσες κόρες έχετε; (ζωντανές ή νεκρές)

αριθμός 88
καμιά 00 99 (8-9)

88. Πόσους αδελφούς έχετε; (ζωντανούς ή νεκρούς)

αριθμός 88
κανένα 00 99 (10-11)

89. Πόσες αδελφές έχετε; (ζωντανές ή νεκρές)

αριθμός 88
καμιά 00 99 (12-13)

90. Ποία θέση έχετε στην οικογένεια; κωδικοποιήστε:
μεγαλύτερος 01, δεύτερος 02 κτλ

θέση 88
99 (14-15)

Για τα κατωτέρω καταγράψτε την καλύτερη εκτίμηση
For the following, record the best estimate.

91. Είναι η μητέρα σας ζωντανή;

Πόσων ετών είναι;

ηλικία 888
όχι ζωντανή 000 999 (16-18)

92. (Αν δεν είναι ζωντανή) Περίπου πόσων ετών ήταν η μητέρα σας όταν πέθανε;	ηλικία 888 ζωντανή 000 999 (19-21)
93. Είναι ζωντανός ο πατέρας σας; Αν ναι πόσων ετών είναι;	ηλικία 888 όχι ζωντανός 000 999 (22-24)
94. (Αν δεν είναι ζωντανός) Πόσων ετών περίπου ήταν ο πατέρας σας όταν πέθανε;	ηλικία 888 ζωντανός 000 999 (25-27)

Record in the appropriate brackets the number of affected relatives. Explain

diseases if necessary. Καταγράψτε στις παρενθέσεις των αριθμό των προσβεβλημένων συγγενών επεξηγήστε τις ασθένειες αν είναι απαραίτητο

Have any of your relatives by blood had special difficulty with memory or got very confused, and had to go into an institution because they couldn't look after themselves

-Έχετε καθόλου συγγενείς εξ αίματος που να έχουν προβλήματα μνήμης ή να είναι συγκεχυμένοι ή να έχουν μπει σε ίδρυμα επειδή δεν μπορούσαν να φροντίσουν τον εαυτό τους;

95. Συγγενείς γένους θηλυκού: μητέρα, αδελφές (), κόρες () αριθμός 88
καμιά 00 99 (28-29)

96. Συγγενείς γένους αρσενικού: πατέρας, αδελφοί (), γιοι () αριθμός 88
κανένας 00 99 (30-31)

- heart attack or die suddenly and unexpectedly

-Εμφάνισε κανένας από τους συγγενείς σας καρδιακή προσβολή ή πέθανε απότομα;προσδόκητα;)

97. Συγγενείς γένους θηλυκού: μητέρα, αδελφές (), κόρες () αριθμός 88
καμιά 00 99 (32-33)

98. Συγγενείς γένους αρσενικού: πατέρας, αδελφοί (), γιοι () αριθμός 88
κανένας 00 99 (34-35)

- stroke or sudden weakness or speech difficulty

-Εμφάνισε κανένας από τους συγγενείς σας εγκεφαλικό επεισόδιο ή ξαφνική αδυναμία ή δυσκολία στην ομιλία;

99. Συγγενείς γένους θηλυκού: μητέρα, αδελφές (), κόρες () αριθμός 88
καμιά 00 99 (3-37)

100. Συγγενείς γένους αρσενικού: πατέρας, αδελφοί (), γιοι () αριθμός 88
κανένας 00 99 (38-39)

- high blood pressure -Είχε κανένας από τους συγγενείς σας υψηλή αρτηριακή πίεση;

101. Συγγενείς γένους θηλυκού: μητέρα, αδελφές (), κόρες () αριθμός 88
καμιά 00 99 (40-41)

102. Συγγενείς γένους αρσενικού: πατέρας, αδελφοί (), γιοι ()	αριθμός	88	(42-43)
	κανένας	00	99	

- diabetes -Είχε κανένας από τους συγγενείς σας σακχαρώδη διαβήτη;

103. Συγγενείς γένους θηλυκού: μητέρα, αδελφές (), κόρες ()	αριθμός	88	(44-45)
	καμιά	00	99	

104. Συγγενείς γένους αρσενικού: πατέρας, αδελφοί (), γιοι ()	αριθμός	88	(46-47)
	κανένας	00	99	

105. Ο εξεταζόμενος;	όχι	0	8	(48)
	ναι	1	9	

-Είχε κανένας από τους συγγενείς σας νόσο του **Parkinson** δηλαδή τρόμο ή καμπουριάζει; (δυσκαμψία;)

106. Συγγενείς γένους θηλυκού: μητέρα, αδελφές (), κόρες ()	αριθμός	88	(49-50)
	καμιά	00	89	

107. Συγγενείς γένους αρσενικού: πατέρας, αδελφοί (), γιοι ()	αριθμός	88	(51-52)
	κανένας	00	99	

108. Ο εξεταζόμενος;	όχι	0	8	(53)
	ναι	1	9	

-Είχε κανένας από τους συγγενείς σας παιδί με νοητική καθυστέρηση ή σύνδρομο **Down**; (καθυστηρισμένος)

Καταγράψτε τον αριθμό των ατόμων που έχουν ένα ή περισσότερα παιδιά με σ. Down.

109. Συγγενείς γένους θηλυκού: μητέρα, αδελφές (), κόρες ()	Αριθμός	88	(54-55)
	καμιά	00	89	

110. Συγγενείς γένους αρσενικού: πατέρας, αδελφοί (), γιοι ()	αριθμός	88	(56-57)
	κανένας	00	99	

111. Ο εξεταζόμενος;	όχι	0	8	(58)
	ναι	1	9	

- leukaemia -Έπασχε κανείς από την οικογένειά σας από λευχαιμία;

112. Συγγενείς γένους θηλυκού: μητέρα, αδελφές (), κόρες ()	Αριθμός	88	(59-60)
	καμιά	00	89	

113. Συγγενείς γένους αρσενικού: πατέρας, αδελφοί (), γιοι ()	αριθμός	88	(61-62)
	κανένας	00	99	

114. Ο εξεταζόμενος;	όχι	0	8	(63)
	ναι	1	9	

- cancer -Έπασχε κανείς από την οικογένειά σας από καρκίνο;

115. Συγγενείς γένους θηλυκού: μητέρα, αδελφές (), κόρες ()	Αριθμός	88	(64-65)
	καμιά	00		

89

116. Συγγενείς γένους αρσενικού: πατέρας, αδελφοί (), γιοι ()	αριθμός	88	(66-67)
	κανένας	00		

99

117. Ο εξεταζόμενος;	όχι	0	8	(68)
	ναι	1	9	

καθορίστε είδος (type of cancer) (69)

- emotional or nervous illness requiring treatment

Έπασχε κανείς από την οικογένειά σας από ψυχιατρική ή νευρολογική ασθένεια ώστε να χρειάστηκε θεραπεία;

118. Συγγενείς γένους θηλυκού: μητέρα, αδελφές (), κόρες ()	Αριθμός	88	(70-71)
	καμιά	00		

89

119. Συγγενείς γένους αρσενικού: πατέρας, αδελφοί (), γιοι ()	αριθμός	88	(72-73)
	κανένας	00		

99

καθορίστε είδος (specify type of nervous illness).....(74)

03 (79-80)

ΜΕΡΟΣ Β.

Εξέταση των γνωστικών λειτουργιών - Cognitive Examination

Πριν να ξεκινήσετε, βεβαιωθείτε ότι έχετε τα παρακάτω μαζί σας:

Σημειωματάριο - blank A4 sheet of paper

Στυλό - pencil

ρολόι ή χρονόμετρο - stopwatch

το εγχειρίδιο με τις εικόνες - booklet

ένα φάκελο - envelope

ένα μεγάλο νόμισμα (πχ πενήνταρικο) και ένα μικρό (πχ τάληρο) – 5 and 50 cents

Αυτό το μέρος περιλαμβάνει και τα 19 αντικείμενα του MMSE (Mini Mental State Examination των Folstein et al 1975). Μερικά από αυτά αλλά όχι όλα χρησιμεύουν στον υπολογισμό της επίδοσης στο Cambridge Cognitive Examination (CAMCOG).

Είναι σημαντικό να μιλάτε αργά και καθαρά. Αν ο εξεταζόμενος δείχνει να μην άκουσε ή κατάλαβε την ερώτηση, επαναλάβετε την εκτός αν το αντικείμενο αυτό ειδικά απαγορεύεται να επαναληφθεί.

ΜΗ ΔΙΟΡΘΩΝΕΤΕ ΤΟΝ ΕΞΕΤΑΖΟΜΕΝΟ ΑΝ ΔΩΣΕΙ ΛΑΘΟΣ ΑΠΑΝΤΗΣΗ.

Σημειώστε ασυνήθιστες απαντήσεις καθώς και την ανάκληση επιπλέον των δοθέντων αντικειμένων προς ανάκληση.

ΚΩΔΙΚΟΠΟΙΗΣΗ: Αυτό το μέρος διαφέρει από τα άλλα τμήματα του CAMDEX στο ότι όταν οι εξεταζόμενοι δεν ξέρουν ή αρνούνται να απαντήσουν βαθμολογούνται με 0. Όταν σημειώσετε 9 ή 99 καθορίστε γιατί η ερώτηση δεν έγινε.

- **Booklet**
- **Pencil**
- **Stopwatch**
- **Blank sheet of A4 paper**
- **Envelope**
- **5 and 50 cents**

- **Speak slowly and clearly**
- **if the subject appears not to have heard or understood, repeat the question, (unless item specifically prohibits repetition)**
- **DO NOT CORRECT IF A WRONG ANSWER IS GIVEN**
- **make a note of any unusual responses including extra memory items recalled**
- **Coding: subject's who don't know, refuse to answer or give a silly answer are given a score of 0 which equals an incorrect answer, where a score of 9 or 99 is given indicate why the question was not asked**

Θα σας κάνω τώρα μερικές ερωτήσεις που αφορούν τη μνήμη σας και (την ικανότητά σας για) συγκέντρωση. Μερικές θα σας φανούν πολύ εύκολες άλλες δύσκολες, όμως είναι ανάγκη να ρωτάμε όλους τα ίδια πράγματα.

ΠΡΟΣΑΝΑΤΟΛΙΣΜΟΣ - orientation

Χρόνος - time

[επαναλαμβάνουμε τα αντικείμενα 1-5, repeat col. 1-5]

120. Τι μέρα της εβδομάδας έχουμε; Day of the week	λάθος σωστό	0 1	9	(6)
121. Ημέρα ποιά είναι η ημερομηνία σήμερα; Date	λάθος σωστό	0 1	9	(7)
122. Μήνας month	λάθος σωστό	0 1	9	(8)
123. Έτος year	λάθος σωστό	0 1	9	(9)
124. Εποχή season	λάθος σωστό	0 1	9	(10)
δεχθείτε ως σωστές «οριακές» απαντήσεις όταν αλλάζουν οι εποχές Μάρτιος: χειμώνας / άνοιξη Ιούνιος: άνοιξη / καλοκαίρι Σεπτέμβριος: καλοκαίρι / φθινόπωρο Δεκέμβριος: φθινόπωρο / χειμώνας	summer/autumn autumn/winter winter/spring spring / summer			

Τόπος - place

125. Μπορείτε να μου πείτε που βρισκόμαστε τώρα; Για παράδειγμα σε ποια χώρα βρισκόμαστε; Country	λάθος σωστό	0 1	9	(11)
126. Ποιο είναι το όνομα αυτής της πόλης; Town/city	λάθος σωστό	0 1	9	(12)
127. Πώς λέγονται οι δυο πιο σημαντικοί δρόμοι γύρω από το σπίτι σας; Main streets	λάθος σωστό	0 1	9	(13)
128. Σε ποιον όροφο βρισκόμαστε τώρα; Floor omit	λάθος σωστό	0 1	9	(14)
129. Πώς λέγεται αυτό το μέρος; (ή ποια είναι η διεύθυνση εδώ - αν η εξέταση γίνεται σπίτι του) - address or name of place	λάθος σωστό	0 1	9	(15)

ΓΛΩΣΣΑ - language

Κατανόηση: κινητική απάντηση – comprehension: motor response

Should the subject not complete the full sequence then the whole instruction may be repeated, without change in tone or tempo, to ensure that it has been heard and understood. Prompting and coaching stage by stage are not allowed.

Αν ο εξεταζόμενος δεν ανταποκριθεί πλήρως τότε μπορεί να επαναληφθεί ολόκληρη η οδηγία χωρίς αλλαγή στη χροιά της φωνής ή στο ρυθμό ώστε να εξασφαλιστεί ότι ο εξεταζόμενος άκουσε και κατάλαβε. Δεν επιτρέπεται η βοήθεια ούτε η εκμείευση βήμα – βήμα

Θα σας ζητήσω τώρα να κάνετε (εκτελέσετε) ορισμένες κινήσεις, έτσι παρακαλώ ακούστε με προσεκτικά.

- | | | | | |
|--------------------------------------------------------------------------|-------|---|---|------|
| 130. Παρακαλώ κάντε «ναι» με το κεφάλι | λάθος | 0 | | |
| | σωστό | 1 | 9 | (16) |
| 131. Αγγίξτε το δεξί σας αυτί με το αριστερό σας χέρι. | λάθος | 0 | | |
| | σωστό | 1 | 9 | (17) |
| 132. Πριν κοιτάξετε στο ταβάνι παρακαλώ κοιτάζτε στο πάτωμα. | λάθος | 0 | | |
| | σωστό | 1 | 9 | (18) |
| 133. Κτυπήστε κάθε ώμο σας με δύο δάκτυλα δύο φορές με τα μάτια κλειστά. | λάθος | 0 | | |
| | σωστό | 1 | 9 | (19) |

Κατανόηση: λεκτική απάντηση – comprehension: verbal response

Θα σας κάνω τώρα μερικές ερωτήσεις και θα ήθελα να μου απαντήσετε με ένα «ναι» ή ένα «όχι».

- | | | | | |
|-----------------------------------------------------------|-------|---|---|------|
| 134. Είναι αυτό το μέρος ξενοδοχείο; | λάθος | 0 | | |
| | σωστό | 1 | 9 | (20) |
| 135. Είναι τα χωριά μεγαλύτερα από τις πόλεις; | λάθος | 0 | | |
| | σωστό | 1 | 9 | (21) |
| 136. Υπήρχε ραδιόφωνο στην Ελλάδα πριν από την τηλεόραση; | λάθος | 0 | | |
| | σωστό | 1 | 9 | (22) |

Έκφραση: κατονομασία – expression: naming

In qns 137-138 **accurate naming is needed**; descriptions of function or approximate answers are not acceptable. Some items may have more than one correct name, as has been indicated. In the case of approximate answers, you should say ‘Can you think of another word for it?’

Στις ερωτήσεις 137-138 είναι απαραίτητη η ακριβής κατονομασία. Περιγραφικές ή κατά προσέγγιση απαντήσεις απορρίπτονται.

Μερικά αντικείμενα μπορεί να έχουν περισσότερες από μία σωστές ονομασίες. Ως λάθος λαμβάνονται απαντήσεις περιγραφικές της λειτουργίας (πχ «μετράει το χρόνο» αντί για ρολόι) ή κατά προσέγγιση σωστές απαντήσεις (τσάντα αντί για βαλίτσα). Σε περίπτωση τέτοιας απαντήσεως θα πρέπει να πείτε:

«Μήπως θα μπορούσατε να σκεφτείτε κάποια άλλη λέξη γι' αυτό;»

σημειώστε το συνολικό αριθμό σωστών απαντήσεων.

137. (Δείχνετε το **στυλό** σας)

Πώς λέγεται αυτό;

(Δείχνετε το **ρολόι** σας)

Πώς λέγεται αυτό;

.....
.....
ΣΥΝΟΛΟ 9 (23)

138. Θα σας δείξω μερικά αντικείμενα. Παρακαλώ πείτε μου πώς ονομάζεται καθένα.

(δείξτε τις εικόνες στο συνοδευτικό βιβλίο)

show 'Pictures for naming' in booklet

total
παπούτσι, σανδάλι 0 1
γραφομηχανή 0 1
ζυγαριά 0 1
βαλίτσα 0 1
βαρόμετρο 0 1
πορτατίφ 0 1
ΣΥΝΟΛΟ 9 (24)

139. Πείτε μου τα ονόματα όσο πιο πολλών ζώων μπορείτε μέσα σε ένα λεπτό.

(μόνο αν ο εξεταζόμενος ρωτήσει επεξηγήστε ότι στα ζώα περιλαμβάνονται τα πουλιά, τα έντομα, τα ερπετά κτλ. Αν ο εξεταζόμενος κολλήσει, ενθαρρύνετε τον: «Μπορείτε να σκεφτείτε κανένα άλλο;»)

Οι επαναλήψεις δεν καταγράφονται

αριθμός ονομάτων Κωδ
number correct
0 0
1-4 1
5-9 2
10-14 3
15-19 4
20-24 5 9 (25)
25+ 6

Repetitions not counted, list all items

Έκφραση: ορισμοί – expression: definitions

140. Τι κάνουμε με ένα σφυρί;
- | | | | |
|------------------|---|---|------|
| λάθος | 0 | | |
| κάθε σωστή χρήση | 1 | 9 | (26) |
141. Από που συνήθως αγοράζουμε φάρμακα;
- | | | | |
|------------------------------------------|---|---|------|
| κατάστημα (δε μπορεί να το προσδιορίσει) | 0 | | |
| φαρμακείο | 1 | 9 | (27) |

In qns 142-143 a concrete definition scores 1 and an abstract definition scores 2.

Examples are given beside each score.

στις ερωτήσεις 142-143 η «φτωχή» απάντηση παίρνει 1 βαθμό ενώ η «πλήρης» παίρνει 2. Παραδείγματα δίνονται δίπλα σε κάθε βαθμό.

142. Τι είναι μια γέφυρα;
- | | | | |
|---------------------------|---|---|------|
| λάθος | 0 | | |
| περνάμε τη γέφυρα | 1 | | |
| περνά πάνω από ποτάμι κτλ | 2 | 9 | (28) |
143. Τι είναι μια γνώμη;
- | | | | |
|--------------------------------|---|---|------|
| λάθος | 0 | | |
| μια καλή γνώμη για κάποιον | 1 | | |
| η άποψη ενός ανθρώπου για κάτι | 2 | 9 | (29) |

Κατανόηση: επανάληψη – expression: repetition

Only one presentation is allowed so it is essential that you read the phrase clearly and slowly, enunciating all the S's.

Μόνο μια παρουσίαση επιτρέπεται, γι' αυτό διαβάστε τη φράση αργά και καθαρά, τονίζοντας όλα τα «ς».

144. Θα σας πω μια φράση και θα ήθελα να την επαναλάβετε μετά από μένα: « ΤΗΣ ΠΟΛΗΣ, ΤΗΣ ΠΑΛΗΣ, ΤΗΣ ΟΛΗΣ.
- | | | | |
|-------|---|---|------|
| λάθος | 0 | | |
| σωστό | 1 | 9 | (30) |
- ~~145 — cookie picture omitted —~~

MNΗΜΗ - memory

Ανάκληση - recall

146. Μπορείτε να θυμηθείτε τα αντικείμενα στις έγχρωμες εικόνες που σας έδειξα πριν λίγο;
- Either description or names are acceptable**
- δεκτή και περιγραφή και ονόματα
σημειώστε κάθε αντικείμενο που ανακαλείται σωστά και στο τέλος τον συνολικό αριθμό
- | | | | |
|-------------------|---|---|------|
| παπούτσι, σανδάλι | 0 | 1 | |
| γραφομηχανή | 0 | 1 | |
| ζυγαριά | 0 | 1 | |
| βαλίτσα | 0 | 1 | |
| βαρόμετρο | 0 | 1 | |
| πορτατίφ | 0 | 1 | 9 |
| ΣΥΝΟΛΟ | | | (31) |

Αναγνώριση – recognition

147. Ποιά από αυτά σας έδειξα πριν;

Δείξτε τις «εικόνες για αναγνώριση» από το συνοδευτικό βιβλίο.

Σημειώστε κάθε αντικείμενο που ανακαλείται σωστά και στο τέλος τον συνολικό αριθμό.

παπούτσι, σανδάλι	0	1		
γραφομηχανή	0	1		
ζυγαριά	0	1		
βαλίτσα	0	1		
βαρόμετρο	0	1		
πορτατίφ	0	1	9	(32)
ΣΥΝΟΛΟ				

Show 'Pictures for recognition'

Ανάκληση παλαιών πληροφοριών – retrieval of remote information

Τώρα θα σας κάνω μερικές ερωτήσεις για το παρελθόν.

Σημείωση: Ο εξεταστής θα πρέπει να δώσει ιδιαίτερη προσοχή ώστε να μην παρεκκλίνει καθόλου από το κείμενο των παρακάτω ερωτήσεων, για να διατηρηθεί εντοπισμένος ο γνωστικός τομέας που διερευνάται. STRICK ADMINISTRATION (within 1 year)

148. Μπορείτε να μου πείτε πότε απελευθερώθηκε η Θεσσαλονίκη;	λάθος	0		
	1912	1	9	(33)
- Μπορείτε να μου πείτε ποτέ άρχισε ο Πρώτος Παγκόσμιος Πόλεμος;	λάθος	0		
	1914	1	9	
149. Μπορείτε να μου πείτε πότε μας επετέθησαν οι Ιταλοί;	λάθος	0		
	1940	1	9	(34)
- Μπορείτε να μου πείτε ποτέ άρχισε ο Δεύτερος Παγκόσμιος Πόλεμος;	λάθος	0		
	1939	1	9	
150. Ποιος ήταν τότε ο αρχηγός των Γερμανών (στον Δεύτερον Παγκόσμιον Πόλεμο);	Λάθος	0		
	Χίτλερ	1	9	(35)
151. Ποιος ήταν τότε ο αρχηγός των Ιταλών;	Λάθος	0		
	Μουσολίνι	1	9	(36)
<u>Ποιος ήταν τότε ο αρχηγός των Ρώσων;</u>	Λάθος	0		
	Stalin	1	9	
<u>Πότε επιτέθηκαν οι Ιαπωνέζι το Darwin;</u>	Λάθος	0		
	1942	1	9	

152. Ποιος ήταν ο Κουταλιανός;

Λάθος 0
Σωστό 1 9 (37)

Ποια ήταν η Mae West?

Λάθος 0
Entertainer, film star 1 9

Ποιος ήταν ο Errol Flynn?

Λάθος 0
Entertainer, film star 1 9

153. Θυμάστε πώς λεγόταν ο «Δράκος του Σείχ Σού»;

λάθος 0
Παγκρατίδης 1 9 (38)

Ποιος ήταν ο διάσημος πιλοτής οποιού ο γιος είχε κλεφτεί;
(close name approximation, ok)

Λάθος 0
Lindbergh 1 9

Ποιος ήταν ο διάσημος κλέφτης με σιδερένια μάσκα που τα έβαλε με το νόμο στην Αυστραλία;

Λάθος 0
Ned Kelly 1 9

Ανάκληση πρόσφατης πληροφορίας **Retrieval of recent information**

154. Ποιος είναι σήμερα Πρωθυπουργός;
(Australian Prime Minister)

λάθος 0
σωστό 1 9 (39)

Ποιο είναι το όνομα της Βασίλισσας;

Incorrect 0
Correct 1 9

155. Ποιος είναι Πρόεδρος της Δημοκρατίας;
(Greece)

λάθος 0
σωστό 1 9 (40)

Ποιος θα λάβει το θρόνο μετά από την Βασίλισσα;

Incorrect 0
Correct 1 9

156. Ποιος είναι αρχηγός της Αξιωματικής Αντιπολίτευσης;
(Greek opposition leader)

λάθος 0
σωστό 1 9

Ποιος είναι σήμερα Πρωθυπουργός;
(Greek Prime Minister)

Incorrect 0 (41)
Correct 1 9

Σημ. Σε περίοδο εκλογών ή λίγο μετά και αν δοθεί το όνομα του προηγούμενου κάντε διευκρινιστική ερώτηση: «είναι ακόμα Πρόεδρος, Πρωθυπουργός κτλ.»

157. Ποιο σημαντικό γεγονός ακούγεται στις ειδήσεις τις τελευταίες δύο εβδομάδες;

λάθος 0 (42)
σωστό 1 9

Αν δοθεί μια γενική απάντηση πχ «πόλεμος» ζητείστε διευκρινήσεις.

Καταχώρηση - registration

Τώρα θα σας πω τρεις λέξεις. Αμέσως μετά θα σας ζητήσω να τις επαναλάβετε. Θα σας τις ξαναρωτήσω μετά από μερικά λεπτά, γι' αυτό προσπαθήστε να τις θυμάστε.

158. (Ονομάστε τα παρακάτω αντικείμενα με παύση ενός δευτερολέπτου ανάμεσά τους): μήλο, τραπέζι, δραχμή.

- tick items which are correct on the *first* attempt

- if any errors or omissions are made on the first attempt, repeat all names until subject learns all three (maximum of five repeats, record number of repeats)

Σημειώστε τις σωστές απαντήσεις με την πρώτη προσπάθεια καθώς και τον συνολικό τους αριθμό

Αν σημειωθούν λάθη ή παραλήψεις κατά την πρώτη προσπάθεια, επαναλάβετε τα αντικείμενα μέχρι να τα μάθει ο εξεταζόμενος. (το πολύ πέντε επαναλήψεις).

Καταγράψτε τον αριθμό των επαναλήψεων (0 αν όλα είναι σωστά με την πρώτη προσπάθεια)

μήλο
τραπέζι
δραχμή

ΣΥΝΟΛΟ 9 (43)
ΕΠΙΠΛΗΡΩΣΕΙΣ (44)
of repeats

ΠΡΟΣΟΧΗ/ΣΥΓΚΕΝΤΡΩΣΗ

- attention/concentration

159. Τώρα θα ήθελα να μετρήσετε αντίστροφα αρχίζοντας από το 20 – backwards

20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1

δύο ή περισσότερα λάθη 0
ένα λάθος 1
σωστά 2

9 (45)

160. Τώρα θα ήθελα να αφαιρέσετε 7 από το 100. Ξανααφαιρέστε 7 από τον αριθμό που βρήκατε. Συνεχίστε να αφαιρείτε 7 μέχρι να σας πω να σταματήσετε.

Καταγράψτε τις απαντήσεις. Δώστε 1 βαθμό για κάθε σωστή αφαίρεση ακόμα κι αν η προηγούμενη ήταν λάθος. Μέγιστη Επίδοση = 5 βαθμοί (max)

απάντηση του
εξεταζόμενου

93 0 1
86 0 1
79 0 1
72 0 1
65 0 1

ΣΥΝΟΛΟ 9 (46)

ΜΝΗΜΗ/ΑΝΑΚΛΗΣΗ – memory: recall

161. Ποιά ήταν τα τρία αντικείμενα που σας ζήτησα να μάθετε πριν λίγο;

Σημειώστε κάθε σωστή απάντηση καθώς και το συνολικό αριθμό

μήλο
τραπέζι
δραχμή
ΣΥΝΟΛΟ

9 (47)

ΓΛΩΣΣΑ: ΚΑΤΑΝΟΗΣΗ ΓΡΑΠΤΟΥ ΛΟΓΟΥ

Language: reading comprehension

Show 'Reading comprehension' in booklet. It is not necessary for subject to read aloud. If subject reads instructions but fails to carry out action, say 'Now do what it says.'

Read this page and then do what it says.

Δείξτε το τμήμα «κατανόηση του γραπτού λόγου» στο συνοδευτικό βιβλίο. Δεν είναι απαραίτητο να διαβάσει ο εξεταζόμενος δυνατά. Αν ο εξεταζόμενος διαβάζει, όμως δεν εκτελεί τις ενέργειες που είναι γραμμένες, πείτε: «κάντε ότι γράφει»

162. «ΚΛΕΙΣΤΕ ΤΑ ΜΑΤΙΑ ΣΑΣ »

Λάθος 0
Σωστό 1 9 (48)

163. «ΑΝ ΕΙΣΤΕ ΠΑΝΩ ΑΠΟ 50 ΕΤΩΝ ΒΑΛΤΕ ΤΑ ΧΕΡΙΑ ΣΑΣ ΠΙΣΩ ΑΠΟ ΤΟ ΚΕΦΑΛΙ ΣΑΣ »

λάθος 0
σωστό 1 9 (48)

κωδικοποιήστε με 1 μόνο αν η ενέργεια εκτελείται σωστά code 1 if action is carried out correctly

ΕΥΠΡΑΞΙΑ - praxis

Αντιγραφή και ζωγραφική – copying and drawing

Ο εξεταζόμενος πρέπει να γράψει και να ζωγραφίσει στο χαρτί που θα του δοθεί.

164. Αντιγράψτε αυτό το σχέδιο (πεντάγωνο).

(κάθε πεντάγωνο πρέπει να έχει 5 πλευρές και 5 καθαρές γωνίες και η αλληλοεπικάλυψη να σχηματίζει ρόμβο)
each pentagon should have 5 sides and 5 clear corners and the overlap should form a diamond

λάθος 0
σωστό 1 9 (49)

165. Αντιγράψτε αυτό το σχέδιο (σπείρα)

(απαιτούνται τουλάχιστον 3 συνεχόμενοι βρόγχοι προς την ίδια κατεύθυνση)
3 connected loops are required in the correct orientation

λάθος 0
σωστό 1 9 (50)

166. Αντιγράψτε αυτό το σχέδιο (τρισδιάστατο σπίτι)

(απαραίτητα τα παράθυρα, η πόρτα και η καμινάδα στη σωστή θέση και με τρισδιάστατη απεικόνιση)
requires windows, door and chimney in correct position and in 3D representation

λάθος 0
σωστό 1 9 (52)

167. Ζωγραφίστε ένα ρολόι και τοποθετήστε τους αριθμούς μέσα. κύκλος (αποδεκτό και τετράγωνο) ..
όλοι οι αριθμοί σε σωστή θέση ..

Όταν ο εξεταζόμενος το κάνει αυτό, τότε πείτε: σωστή ώρα ..
«Τώρα τοποθετήστε τους δείκτες ώστε να δείχνουν 11 και 10». ΣΥΝΟΛΟ .. 9 (53)

Αυθόρμητη γραφή- writing spontaneous

168. Γράψτε μια πλήρη δική σας πρόταση σ' αυτό το χαρτί.

Write a complete sentence on this sheet of paper. λάθος 0
Spelling and grammar are not important. The sentence must have a subject σωστό 1 9 (54)
(real or implied), and a verb. 'Help!' or 'Go away' are acceptable.

(δείξτε στον εξεταζόμενο την σελίδα που προηγουμένως ζωγράφισε)
Ακολουθώς ρωτήστε τον τι έγραψε. Η γραμματική και η ορθογραφία δεν έχουν σημασία.
Η πρόταση πρέπει να έχει ρήμα και υποκείμενο (πραγματικό ή να εννοείται). Αποδεκτές γίνονται και οι φράσεις: «βοήθεια» και «φύγε μακριά»

Ιδεατή ευπραξία – praxis: ideational

Read the following statement and then hand to the subject a sheet of paper.

Make a point of handing to the subject's midline.

Διαβάστε την παρακάτω δήλωση προς τον εξεταζόμενο, και δώστε του ένα φύλλο χαρτί ΠΡΟΣΕΧΟΝΤΑΣ ΝΑ ΤΟ ΔΩΣΕΤΕ ΣΤΗ «ΜΕΣΗ ΓΡΑΜΜΗ» ΤΟΥ ΕΞΕΤΑΖΟΜΕΝΟΥ.

169. Θα σας δώσω ένα φύλλο χαρτί. Θέλω να το πάρετε με το δεξί σας χέρι, να το διπλώσετε στα δύο και να το αφήσετε μετά πάνω στο τραπέζι.

(Μην επαναλάβετε τις οδηγίες και μην καθοδηγήσετε τον εξεταζόμενο. Σημειώστε μια κίνηση ως σωστή αν γίνει στο σωστό χρόνο. Σημειώστε κάθε σωστή κίνηση και το συνολικό αριθμό τους. ΜΕΓΙΣΤΗ ΕΠΙΔΟΣΗ: 3 βαθμοί (max = 3)

Do not repeat instructions or coach. Score a move as correct only if it takes place in the correct sequence.

δεξί χέρι	.....		
δίπλωμα	.....		
πάνω στο				
τραπέζι	.....		
ΣΥΝΟΛΟ	....	9	(55)	

Δώστε ένα φάκελο στον εξεταζόμενο Hand an envelope to subject.

170. Βάλτε το χαρτί στο φάκελο και σφραγίστε τον.

λάθος	0			
σωστό	1	9	(56)	

Γραφή καθ' υπαγόρευση - writing to dictation

171. Γράψτε το ακόλουθο όνομα και διεύθυνση στο φάκελο:

κ. Παπαδόπουλο Ιωάννη Mr John Brown

Παπάφη 35 42 West Street

Θεσσαλονίκη Bedford

λάθος	0			
αποδεκτό	1			
σωστό	2	9	(57)	

Η ακρίβεια της γραφής και η ορθογραφία δεν έχουν σημασία.

Σημασία έχει το κατά πόσον το γράμμα θα είχε πιθανότητες να φτάσει

στον προορισμό του. Πχ «Γιανισ» ή «Σαλονίκι» είναι αποδεκτά όχι

όμως το «34» ή το «Παπα» 24, Burford – incorrect, Jon Brwn ok

ΕΠΕΙΤΑ ΠΕΙΤΕ: προσπαθήστε να θυμάστε αυτή τη διεύθυνση γιατί θα σας την ξαναρωτήσω αργότερα. Αν ο εξεταζόμενος δε μπορεί να γράψει, διαβάστε την αργά δύο φορές και ζητήστε του να την θυμάται.

Please try to remember this name and address as I shall be asking you about them later on. If subject is unable to write, say the address slowly, twice, and ask him/her to remember it.

Ιδεοκινητική ευπραξία – praxis: ideomotor

172. Δείξτε μου πώς χαιρετάτε «γεια»

show me how you wave goodbye (γνέφετε)

λάθος	0			
σωστό	1	9	(58)	

In 173-174 a correct mime is needed. If the subject uses fingers to represent scissors or brush, say eg 'Pretend you are holding a toothbrush.'

Score 1 if subject makes brushing movement but not as though holding a toothbrush.

Στις ερωτήσεις 173-174 απαιτείται σωστή παντομίμα. Αν ο εξεταζόμενος χρησιμοποιεί τα δάκτυλα δείχνοντας ακριβώς την κίνηση της οδοντόβουρτσας ή του ψαλιδιού, πείτε: «κάντε σα να κρατάτε οδοντόβουρτσα» Σημειώστε 1, αν η κίνηση γίνεται αλλά όχι σα να κρατά το αντικείμενο.

173. Δείξτε μου πως κόβουμε με ένα ψαλίδι.

λάθος	0			
αποδεκτό	1			
σωστό	2	9	(59)	

174. Δείξτε μου πώς βουρτσίζετε τα δόντια σας με μια οδοντόβουρτσα.

λάθος	0			
αποδεκτό	1			
σωστό	2	9	(60)	

ΑΙΤΤΙΚΗ ΑΝΤΙΛΗΨΗ – perception: tactile

175. Θα σας βάλω τώρα ένα νόμισμα στο χέρι και θα ήθελα να μου πείτε τι είναι, χωρίς να το δείτε.	5 c ...
(Βάλτε στην παλάμη του εξεταζομένου δυο νομίσματα, ένα μικρό και ένα μεγαλύτερο πχ των 5 και των 20 δραχμών. Σημειώστε κάθε σωστή απάντηση και το συνολικό αριθμό. Place a small and large coin one at a time in the subject's hand palm down.	50 c ...
	ΣΥΝΟΛΟ ... 9 (61)

ΑΡΙΘΜΗΤΙΚΟΙ ΥΠΟΛΟΓΙΣΜΟΙ - calculation

Απαιτείται από μνήμης υπολογισμός και δεν επιτρέπεται χαρτί και μολύβι.

Mental calculation is required. Paper and pencil are not allowed.

176. (Τώρα αφήστε τον εξεταζόμενο να δει τα νομίσματα.) Πόσα χρήματα μας κάνουν αυτά;	λάθος 0
καταγράψτε την απάντηση	55 cents σωστό 1 9 (62)

177. Αν κάποιος σας έδινε αυτά τα χρήματα ως ρέστα από ένα δολάριο (κατοστάριο), πόσα χρήματα θα του είχατε δώσει;	λάθος 0
καταγράψτε την απάντηση	45 cents σωστό 1 9 (63)

ΜΝΗΜΗ: ΑΝΑΚΛΗΣΗ – memory: recall

178. Ποιο ήταν το όνομα και η διεύθυνση που γράψατε στο φάκελο πριν λίγο;	κ. Παπαδόπουλο	.....	John
Σημειώστε κάθε σωστή απάντηση και το συνολικό αριθμό.	Ιωάννη	.....	Brown
	Παπάφη	.....	42
	35	.....	West St
	Θεσσαλονίκη	.....	Bedford
	ΣΥΝΟΛΟ	.....	9 (64)

ΑΦΑΙΡΕΤΙΚΗ ΣΚΕΨΗ – abstract thinking

Οι παρακάτω ερωτήσεις ερευνούν την ικανότητα του εξεταζομένου να σκέπτεται αφαιρετικά. Αφαιρετικές απαντήσεις βαθμολογούνται με 2, ενώ οι ακριβείς με 1. Δίδονται παραδείγματα δίπλα σε κάθε βαθμολογία.

Αν ο εξεταζόμενος πει: «δε μοιάζουν καθόλου», πείτε: «μοιάζουν κατά κάποιον τρόπο, μπορείτε να μου πείτε πώς;»

If subject says 'They are not alike', say 'They are alike in some way. Can you tell me in which way they are alike?'

Θα σας πω δυο πράγματα και θα ήθελα να μου πείτε με Ποιο τρόπο μοιάζουν. Για παράδειγμα ένας σκύλος και μια μαϊμού μοιάζουν στο ότι είναι και τα δυο ζώα.

179. Κατά ποιον τρόπο μοιάζουν ένα μήλο και μια μπανάνα;	στρογγυλά, έχουν θερμίδες 0
καταγράψτε την απάντηση	τρώγονται, μεγαλώνουν, έχουν 1
Μόνο γι' αυτήν την ερώτηση αν η βαθμολογία είναι κάτω από 2, πείτε: «επίσης μοιάζουν διότι είναι και τα δύο φρούτα»	φλούδι 2 9 (65)
	φρούτα 2 9 (65)

180. Κατά ποιον τρόπο μοιάζουν ένα πουκάμισο και ένα φόρεμα; καταγράψτε την απάντηση	έχουν κουμπιά 0 φοριούνται, γίνονται από ύφασμα, ζεστά 1 ρούχα 2 9 (66)
181. Κατά ποιον τρόπο μοιάζουν ένα τραπέζι και μια καρέκλα; καταγράψτε την απάντηση	ξύλινα, έχουν 4 πόδια 0 πράγματα του σπιτιού, 1 χρησιμοποιούνται στα γεύματα 2 9 (67) έπιπλα
182. Κατά ποιον τρόπο μοιάζουν ένα φυτό και ένα ζώο; καταγράψτε την απάντηση	χρήσιμα στον άνθρωπο 0 μεγαλώνουν, ανήκουν στη φύση 1 ζωντανά 2 9 (68)

ΟΠΤΙΚΗ ΑΝΤΙΛΗΨΗ – perception: visual

Διάσημα πρόσωπα – Famous people

Δείξτε το τμήμα «αναγνώριση διάσημων προσώπων» από το συνοδευτικό βιβλίο Show 'Recognition of famous people' in booklet

183. Ποιος είναι αυτός; ο εξεταζόμενος πρέπει να πει το όνομα του προσώπου καταγράψτε κάθε απάντηση	(εικ. Προέδρου της Δημοκρατίας) ... (Konstantinos Karamalis) (εικ. Πρωθυπουργού) ... (Andreas Papandreu)
<u>Score as correct if picture is recognised.</u>	<u>Queen</u> ...
<u>Correct name is not required, but record any answer which does not correspond exactly to the examples given.</u>	<u>Pope, Archbishop, bishop</u> ...
	ΣΥΝΟΛΟ ... 9 (69)

Σταθερότητα των μορφών - object constancy

Δείξτε το τμήμα «αναγνώριση των αντικειμένων» στο βιβλίο Show 'Recognition of objects' in booklet

184. Αυτές είναι φωτογραφίες αντικειμένων (παρμένες) από ασυνήθιστες γωνίες. Μπορείτε να τα αναγνωρίσετε; Κριτήριο είναι η αναγνώριση και όχι η ονομασία του αντικειμένου και γι' αυτό περιγραφές του ή της λειτουργίας του είναι αποδεκτές καταγράψτε τις σωστές απαντήσεις και το συνολικό αριθμό τους.	Γυαλιά παπούτσι τσάντα, βαλίτσα φλυτζάνι τηλέφωνο πίπα
Criterion is whether the object is recognised, not that it is named correctly, therefore description of function are acceptable.	ΣΥΝΟΛΟ 9 (70)

Αναγνώριση προσώπου/λειτουργίας – recognition of person/function

185. Μπορείτε να μου πείτε Ποιος είναι αυτός και τι κάνει; Δείξτε οποιονδήποτε (γιατρό, νοσοκόμα, συγγενή) αν δεν υπάρχει κανένας γύρω κωδικοποιήστε 9	λάθος 0 σωστό + 9 (71) omit
<u>Indicate any two people available, eg cleaner, doctor, nurse, patient, relative. If none available score 9.</u>	

ΑΝΤΙΛΗΨΗ ΧΡΟΝΟΥ

186. Χωρίς να κοιτάξετε το ρολόι σας μπορείτε να μου πείτε τι ώρα είναι τώρα;	λάθος	0		
	σωστό	1	9	(71)
187. Χωρίς να κοιτάξετε το ρολόι σας μπορείτε να μου πείτε πόση ώρα νομίζετε ότι μιλάμε μαζί;	λάθος	0		
	σωστό	1	9	(72)
ΚΑΤΑΓΡΑΨΤΕ: ώρα λήξεως της συνεντεύξεως καθώς και διάρκειά της, συγκρίνοντας με την ήδη καταγραμμένη ώρα έναρξεως	Current Time	....	

Geriatric Depression Scale-Greek version

- | | | | |
|----|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|---|
| 1 | Are you basically satisfied with your life?
Είστε βασικά ευχαριστημένοι με τη ζωή σας; | ναι | 0 |
| | | όχι | 1 |
| 2 | Have you dropped many of your activities and interests?
Εγκαταλείψατε πολλές από τις δραστηριότητες και τα ενδιαφέροντά σας; | ναι | 1 |
| | | όχι | 0 |
| 3 | Do you feel that your life is empty?
Αισθάνεστε ότι η ζωή σας είναι άδεια; | ναι | 1 |
| | | όχι | 0 |
| 4 | Do you often get bored?
Βαριέστε συχνά; | ναι | 1 |
| | | όχι | 0 |
| 5 | Are you in good spirits most of the time?
Είστε στα κέφια σας τον περισσότερο καιρό; | ναι | 0 |
| | | όχι | 1 |
| 6 | Are you afraid that something bad is going to happen to you?
Φοβάστε ότι θα σας συμβεί κάτι κακό; | ναι | 1 |
| | | όχι | 0 |
| 7 | Do you feel happy most of the time?
Αισθάνεστε ευτυχισμένος τον περισσότερο καιρό; | ναι | 0 |
| | | όχι | 1 |
| 8 | Do you often feel helpless?
Αισθάνεστε συχνά απελπισμένος; | ναι | 1 |
| | | όχι | 0 |
| 9 | Do you prefer to stay at home rather than go out and do new things?
Προτιμάτε να μένετε στο σπίτι παρά να βγαίνετε έξω και να κάνετε διάφορα καινούρια πράγματα; | ναι | 1 |
| | | όχι | 0 |
| 10 | Do you feel you have more problems with your memory than most?
Αισθάνεστε ότι έχετε περισσότερα προβλήματα με τη μνήμη σας απ' ότι οι άλλοι; | ναι | 1 |
| | | όχι | 0 |
| 11 | Do you think it is wonderful to be alive now?
Πιστεύετε ότι είναι υπέροχο πράγμα που είστε ζωντανός τώρα; | ναι | 0 |
| | | όχι | 1 |
| 12 | Do you feel pretty worthless the way you are now?
Αισθάνεστε άχρηστος έτσι όπως είστε τώρα; | ναι | 1 |
| | | όχι | 0 |
| 13 | Do you feel full of energy?
Αισθάνεστε γεμάτος ενέργεια; | ναι | 0 |
| | | όχι | 1 |

Do you feel that your situation is hopeless?

Αισθάνεστε ότι η κατάστασή σας είναι απελπιστική;

ναι 1

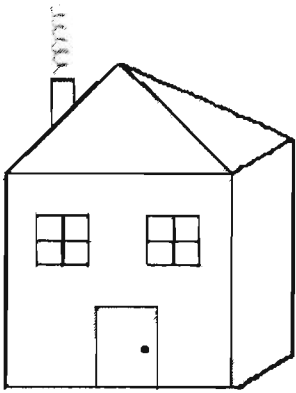
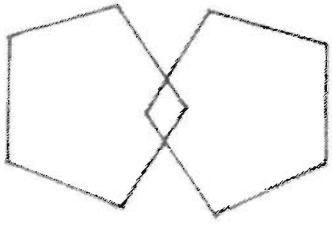
όχι 0

Do you think that most people are better than you are?

Πιστεύετε ότι οι περισσότεροι άνθρωποι είναι σε καλύτερη κατάσταση από εσάς;

ναι 1

όχι 0



ΜΕΡΟΣ ΣΤ:
Κατάλογος παρούσας φαρμακευτικής
αγωγής

Καταγράψτε με λεπτομέρειες την φαρμακευτική αγωγή που λαμβάνει ο ασθενής καθώς και τη χρονική περίοδο για την οποία τη λαμβάνει.

ΜΕΡΟΣ Ζ:
Πρόσθετες πληροφορίες (προαιρετικά)

Καταγράψτε κάθε παρατήρηση ή σχόλιο που κάνατε κατά τη διάρκεια της συνεντεύξεως και αφορά τον ασθενή

ΜΕΡΟΣ Γ: Παρατηρήσεις του εξεταστή Interviewer observations

ΣΥΜΠΛΗΡΩΝΕΤΑΙ ΣΤΟ ΤΕΛΟΣ ΤΗΣ ΕΞΕΤΑΣΗΣ. ΚΩΔΙΚΟΠΟΙΟΥΜΕ «ναι» ΜΟΝΟ ΟΤΑΝ ΤΟ ΧΑΡΑΚΤΗΡΙΣΤΙΚΟ ΕΙΝΑΙ ΣΑΦΩΣ ΠΑΡΟΝ

Code 'yes' only if the characteristic is markedly present. Computer column [επαναλάβετε αντικείμενα 1-5]

188. Έλλειψη ενδιαφέροντος για τον εαυτό του self-neglect	όχι ναι	0 1	(6)
189. Έλλειψη συνεργασίας uncooperative behaviour	όχι ναι	0 1	(7)
190. Καχυποψία suspiciousness	όχι ναι	0 1	(8)
191. Εχθρικός ή ευερέθιστος π.χ θυμωμένη απάντηση hostile or irritable, eg angry response	όχι ναι	0 1	(9)
192. Ανόητη, ανάρμοστη ή περίεργη συμπεριφορά silly, incongruent or bizarre behaviour	όχι ναι	0 1	(10)
193. Βραδύτητα στις αντιδράσεις πχ μένει αφύσικα ακίνητος, αργεί να απαντήσει στις ερωτήσεις slow and underactive: eg sits abnormally still, delay in response to questions	όχι ναι	0 1	(11)
194. Ανησυχία, υπερκινητικότητα πχ ανήσυχοι βηματισμοί ή άσκοπες κινήσεις restless: eg fidgeting, pacing, unnecessary movements	όχι ναι	0 1	(12)
195. Άγχος και φόβος: εμφανίζεται ανήσυχος ή φοβισμένος ή με σωματική ένταση που δεν αντιστοιχεί στις περιστάσεις. Anxiety and fear: appears frightened, worried or somatically tense out of proportion to situation	όχι ναι	0 1	(13)
196. Καταθλιπτική διάθεση: λυπημένος ή δακρυσμένος με φωνή χαμηλή ή σπασμένη. Depressed mood: looks sad, mournful, tearful, voice low or gloomy	όχι ναι	0 1	(14)
197. Ασταθής διάθεση: αλλάζει γρήγορα από λυπημένος σε χαρούμενο, από φιλικό σε εχθρικό. Lability of mood: rapidly changes from sad to happy, friendly to irritable	όχι ναι	0 1	(15)
198. Επίπεδο συναίσθημα: Έλλειψη αυθορμητισμού ή συναισθηματικής ανταπόκρισης προς τον εξετάζοντα. Μονότονη φωνή με έλλειψη χρωματισμού. Flat affect: lack of spontaneous emotion or emotional response to interviewer; monotonous voice and lack of gestures	όχι ναι	0 1	(16)

199. Ψευδαισθήσεις: φέρεται σα να ακούει φωνές ή να βλέπει οράματα ή παραδέχεται ότι συμβαίνει κάτι τέτοιο. Hallucinating: behaves as though hears voices, or sees visions, or admits to doing so	όχι ναι	0 1	(17)
200. Πολύ γρήγορη και δυσνόητη ομιλία Speech very rapid and difficult to follow	όχι ναι	0 1	(18)
201. Πολύ αργή ομιλία με μεγάλες παύσεις μεταξύ των λέξεων. Speech very slow with pauses between the words	όχι ναι	0 1	(19)
202. Φτωχός λόγος: απάντηση μόνο στις ερωτήσεις χωρίς αυθόρμητη έκφραση. Speech restricted in quantity: eg answers to questions only, no spontaneous expressions	όχι ναι	0 1	(20)
203. Λόγος με πλατειασμούς ή ασυνάρτητος, απαντήσεις άσχετες με τις ερωτήσεις. Speech rambling or incoherent, irrelevant answers to questions	όχι ναι	0 1	(21)
204. Από το λόγο του λείπουν φθόγγοι και γενικά μιλά «μασημένα». Speech slurred	όχι ναι	0 1	(22)
205. Εμμονή, διεκδικητικότητα, «κολλώδης ασθενής» Perseveration	όχι ναι	0 1	(23)
206. Έλλειψη εναισθησίας για την παρούσα νόσο. Lack of insight into present disability	όχι ναι	0 1	(24)
207. Έκπτωση του επιπέδου συνειδήσεως. Clouding of consciousness	όχι ναι	0 1	(25)
208. Νεολογισμοί Peculiar use of terms, eg neologisms	όχι ναι	0 1	(26)
209. Μιλά στον εαυτό του. Speaks to self	όχι ναι	0 1	(27)
210. Μειωμένη ικανότητα να εστιάσει, να διατηρήσει και να μεταβάλλει το αντικείμενο της προσοχής του. Impaired ability to focus, sustain and shift attention	όχι ναι	0 1	(28)
211. Δυσκολεύεται να κρίνει καταστάσεις ή ανθρώπους. Impaired judgement of situations and/or persons	όχι ναι	0 1	(29)
212. Υποχονδριακή ενασχόληση με σωματικά ενοχλήματα Hypochondriacal preoccupations with somatic discomfort	όχι ναι	0 1	(30)

Appendix B

- Victoria University of Technology -

*The Standardisation of Greek Neuropsychological Tests in
the Greek-Australian Normal Elderly Population*

INFORMATION TO PARTICIPANTS

We would like to invite you to be a part of a study of tests, which are used in assessing cognition. These tests have been translated to Greek and need to be standardised in the Greek-Australian elderly, so that they are useful for doctors and researchers. We need mature persons over the age of 65 years, men and women, who are active members of the community. Should you wish to participate you will be asked a series of questions relating to your health, mood and cognitive abilities such as memory.

Please participate in this study, if you do not suffer from any of the following conditions: a previous stroke, head injury, a history of mental illness, Parkinson's disease, Dementia, Down's Syndrome, Diabetes, Epilepsy, or if you are blind, deaf, or paralysed.

Any queries about your participation in this project may be directed to the researcher Areti Plitas at home on 8718 7444 or mobile 0425 767 444.

- Victoria University of Technology -

*Στάθμιση από Ελληνικά Νευροψυχολογικά Τέστς
των Έλληνο-Αυστραλιανή Ηλικιωμένων*

ΠΛΗΡΟΦΟΡΙΑ ΤΟΥ ΑΝΤΙΚΕΙΜΕΝΟΥ

Θα θέλαμε να σας καλέσουμε να πάρετε μέρος σε μια μελέτη από τέστς που χρησιμοποιήθηκαν για τη μέτρηση σκέψεων. Αυτά τα τέστς έχουν μεταφραστεί στα ελληνικά και χρειάζεται να εξεταστεί στην Έλληνο-Αυστραλιανή κοινότητα για να είναι χρήσιμα σε γιατρούς και ερευνητές. Χρειαζόμαστε άτομα άνω των 65 ετών, άντρες και γυναίκες που είναι ακόμα δραστήρια μέλη της κοινωνίας. Εάν επιθυμητέ να πάρετε μέρος, θα ερωτηθείτε μια σειρά ερωτήσεων σχετικά με την υγεία, διάθεση και γνωστικές ικανότητες όπως μνήμη.

Σας παρακαλούμε να πάρετε μέρος εάν δεν έχετε τα υπόλοιπα – ψυχιατρική ή νευρολογική ασθένεια, νόσο του Parkinson, άνοια, σύνδρομο Down, σακχαρώδη διαβήτη, Epilepsy, εγκεφαλικό επεισόδιο ή εγκεφαλικό τραύμα.

Για οποιαδήποτε πληροφορία σχετικά με την έρευνα μπορείτε να επικοινωνήσετε με την Αρετή Πλήτα στα εξής τηλέφωνα, 8718 7444 ή 0425 767 444.

*The Standardisation of Greek Neuropsychological Tests in
the Greek-Australian Normal Elderly Population*

INFORMATION TO PARTICIPANTS:

We would like to invite you to be a part of a study of tests which are used in assessing cognition. These tests have been translated to Greek and need to be standardised in the Greek-Australian elderly, so that they are useful for doctors and researchers. We need mature persons over the age of 65 years, men and women, who are active members of the community. Should you wish to participate you will be asked a series of questions relating to your health, mood and cognitive abilities such as memory.

Please sign this consent form if you agree to partake in this study, and if you do **not** suffer from any of the following conditions: a previous stroke, head injury, a history of mental illness, Parkinson's disease, Dementia, Down's Syndrome, Diabetes, Epilepsy, or if you are blind, deaf, or paralysed.

CERTIFICATION BY PARTICIPANT

I, _____
Of _____

certify that I am voluntarily giving my consent to participate in the experiment entitled: *The Standardisation of Greek Neuropsychological Tests in the Greek-Australian Normal Elderly Population being conducted at Victoria University of Technology by: Izabela Walters and Areti Plitas.*

I certify that the objectives of the experiment, together with any risks to me associated with the procedures listed hereunder to be carried out in the experiment, have been fully explained to me by Areti Plitas and that I freely consent to participation involving the use on me of these procedures.

Procedures:

Assessment of emotional and cognitive functioning.

I certify that I have had the opportunity to have any questions answered and that I understand that I can withdraw from this experiment at any time and that this withdrawal will not jeopardise me in any way.

I have been informed that the information I provide will be kept confidential.

Signed: **Date:**.....
Witness other than the experimenter:..... **Date:**

Any queries about your participation in this project may be directed to the researcher (Areti Plitas ph. 8718 7444 or 0425 767 444). If you have any queries or complaints about the way you have been treated, you may contact the Secretary, University Human Research Ethics Committee, Victoria University of Technology, PO Box 14428 MCMC, Melbourne, 8001 (telephone no: 03-9688 4710).

Στάθμιση από Ελληνικά Νευροψυχολογικά Τέστς των Έλληνο-Αυστραλιανή Ηλικιωμένων

Πληροφορία του αντικειμένου

Θα θέλαμε να σας καλέσουμε να πάρετε μέρος σε μια μελέτη από τέστς που χρησιμοποιήθηκαν για τη μέτρηση σκέψεων. Αυτά τα τέστς έχουν μεταφραστεί στα ελληνικά και χρειάζονται να εξεταστούν στην Έλληνο-Αυστραλιανή κοινότητα για να είναι χρήσιμα σε γιατρούς και ερευνητές. Χρειαζόμαστε άτομα άνω των 65 ετών, άντρες και γυναίκες που είναι ακόμα δραστήρια μέλη της κοινωνίας. Εάν επιθυμητέ να πάρετε μέρος, θα ερωτηθείτε μια σειρά ερωτήσεων σχετικά με την υγεία, διάθεση και γνωστικές ικανότητες όπως μνήμη.

Βεβαίωση αντικειμένου

Εγώ _____

Βεβαιώνω ότι εθελοντικά δίνω τη συγκατάθεση μου να πραγματοποιηθεί το επιχείρημα που ονομάζεται Η Στάθμιση από Ελληνικά Νευροψυχολογικά Τέστς στην Έλληνο-Αυστραλιανή Ηλικιωμένη Κοινωνία. Επικοινωνήστε στο Βικτόρια Πανεπιστήμιο της Τεχνολογίας στους, Ιζαμπέλα Γουώλτερς και Αρετή Πλήτα. Βεβαιώνω ότι τα αντικείμενα του πειράματος, μαζί με κάθε ρίσκο έχει αναγνώστη σε μένα με μια λίστα εξηγήσεων που θα χρησιμοποιηθούν στο πείραμα με ολοκληρωμένη και λεπτομερή αντικειμενικότητα, από την Αρετή Πλήτα, και ελευθέρως συγκαταθετω να συμμετάσχω στις εξής διαδικασίες.

Διαδικασίες: Εξέταση των γνωστικών λειτουργιών της τρίτης ηλικίας

Βεβαιώνω ότι είχα την ευκαιρία να απαντήσω σε ερωτήσεις και ότι κατάλαβα ότι μπορώ να σταματήσω απ'αυτο το πείραμα κάθε στιγμή και θα με αποκλείσει από κάθε διακινδύνευση οποιαδήποτε στιγμή. Επίσης έχω πληροφορηθεί ότι οποιαδήποτε πληροφορία που θα δώσω θα παραμείνει απόρρητη.

Υπογράφω _____ Ημερομηνία _____

Μάρτυρας εκτός του επιχειροντος _____ Ημερομηνία _____

Για οποιαδήποτε πληροφορία σχετικά με την έρευνα μπορείτε να επικοινωνήσετε με την Αρετή Πλήτα στα εξής τηλεφώνά, 8718 7444 ή 0425 767 444. Για οτιδήποτε ερωτήσεις και παράπονα έχετε για τον τρόπο συμπεριφοράς των εξετάζων μπορείτε να επικοινωνήσετε το Γραμματέα, Πανεπιστήμιο Ανθρώπινων Ερευνών της Ηθικής Επιτροπής, Βικτόρια Πανεπιστήμιο της Τεχνολογίας PO Box 14428 MCMC, Μελβούρνη, 8001 (Τηλεφωνικό νούμερο 03 9688 4710).

Appendix C

VICTORIA UNIVERSITY

Psychology Department Ethics Committee

Approval Form

Name of Student:

ARETI PLITAS

Name of Supervisor:

12 ARBELA WALTERS

Title of Project:

The standardisation of Creech
neuropsychological tests

Recommendations:

APPLICATION APPROVED

Comments:

The resubmitted application was approved
by both previous reviewers

Name of Chair of Ethics Committee

Keis Ohtsuka

Signature



Date:

14/2/07

