Improving memory in midlife:
A multiple case study evaluation of a group-based memory programme for healthy middle-aged individuals

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ABSTRACT

The research presented in this thesis evaluates a memory programme ($N = 5$) that was specifically designed for middle-aged individuals. A preliminary online survey ($N = 409$) examined the theory of Selective Optimisation with Compensation (SOC) in the context of everyday memory. The survey informed some aspects of the memory programme by examining the relationships between cognitive failures, memory compensation efforts, and control beliefs. Results indicated that SOC endorsement accounted for a significant reduction in everyday cognitive failures (i.e., forgetfulness, distractibility, and false triggering) and a higher sense of memory control. The beneficial effects of memory control beliefs were partially mediated by SOC endorsement. Counter to expectations, SOC endorsement did not affect the forgetfulness/memory compensation relationship. The Midlife Memory Programme, containing four treatment components (i.e., goal pursuit, memory and ageing education, strategy training, and group discussions), was evaluated by a before/after design with a three month follow-up. The data showed improvements in objective and subjective memory performance and worries about memory performance decrements diminished. While the findings were encouraging, a larger scale study is needed to establish the efficacy of the programme.

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OVERVIEW

Considering the developments of the population ageing process, knowledge about the psychology of ageing becomes increasingly important. The subject of this thesis is everyday memory with a specific focus on the memory of middle-aged individuals. While memory difficulties among the elderly may be expected, forgetfulness is also surprisingly common during midlife. Midlife refers to the period of life between 40 and 65 years of age (Lachman, Lewkowics, & Peng, 1994) and longitudinal and cross-sectional research with healthy populations pinpoints the onset of objective memory decline within the fifth decade of life (Schaie, 1996; Larrabee, Trahan, Curtiss, & Levin, 1988; West & Crook, 1990). For example, Ponds, Commissaris, and Jolles (1997) found that 33% of young middle-aged (40 to 50 years of age) and 41% of old middle-aged (55 to 65 years of age) participants considered themselves to be forgetful. Forgetfulness is not without consequences and more than half of middle-aged individuals perceive forgetfulness as an impediment, and 70% worry about it (Commissaris, Ponds, & Jolles, 1998).

Because research consistently shows that memory begins to decline during midlife it may be said that this reflects an *age-appropriate* developmental change. Individuals who experience age-appropriate developmental changes are generally regarded as individuals who age successfully. Despite the high levels of forgetfulness among the successfully ageing middle-aged, the vast majority of memory research focuses on the elderly with moderate to severe memory impairment. As a result, very little is known about the nature of forgetfulness that more than half of successfully ageing middle-aged adults are worried about and perceive as an impediment. This lack of research extends to intervention efforts that may reduce forgetfulness among this cohort, as interventions are also primarily designed for the elderly with moderate to severe impairment.

The theory chosen to explore the research in this thesis is the theory of Selective Optimisation with Compensation (SOC; Baltes & Baltes, 1990) which suggests key strategies (e.g., selection, optimisation, and compensation) that individuals may employ to adapt more successfully to developmental changes. Briefly, the process of selection denotes the course of action involved in developing, choosing, and committing oneself to specific goals (e.g., maintaining memory function). Optimisation denotes the employment

of means aimed at goal achievement (i.e., employing memory strategies); and compensation denotes the employment of means that are necessary to maintain a given level of functioning when confronted with a loss in goal-relevant means (i.e., taking part in a memory programme). In employing SOC as theoretical background, this thesis focuses on age-appropriate forgetfulness among middle-aged individuals. Essentially, individuals who endorse SOC strategies are hypothesised to adapt better to age-appropriate memory decline than those who do not. The research of this thesis is presented in three separate empirical investigations. A survey method was used for study 1 and 2 which examined a number of theoretical links between memory performance and the theory of SOC. Specifically, study 1 set out to answer questions regarding experiences of everyday cognitive failures in relation to SOC strategies and memory compensation efforts. Study 2 examined the relationships between individual's memory control beliefs and experiences of everyday forgetfulness in the context of SOC. Study 3 comprises the main objective of this thesis – the development and implementation of a group-based memory intervention programme that specifically aims to improve memory performance for middle-aged individuals.

In summary, the fact that healthy, middle-aged adults experience worries and inconvenience because of age-appropriate forgetfulness has not been given sufficient attention by psychologists. The research presented in this thesis provides some insight into everyday memory performance for adults of all ages and a novel memory programme that was specifically designed for middle-aged individuals is introduced. The thesis is presented in nine chapters. Chapter one outlines the current status of empirical knowledge pertaining to the processes of successful cognitive ageing. Chapter 2 and 3 review the systems and functions of memory and examine the factors that may impact on memory performance and chapter 4 reviews established memory intervention programmes. These first four chapters underscore the significance of the rationale for this thesis and place it into the current frame of empirical knowledge and theoretical understanding. Chapter 5 formally describes the range of research questions that are addressed by this thesis and chapter 6, 7, and 8 comprise the research studies that have been conducted to examine the research questions that have led to the completion of this

thesis. Finally, Chapter 9 provides a summary and conclusion of the research findings of this thesis.

CHAPTER I
MIDLIFE AND SUCCESSFUL COGNITIVE AGEING: THEORY AND RESEARCH

This chapter examines the most prominent theories of the ageing process and their underlying assumptions. The main objective is to provide a rationale for the theoretical framework that was chosen for the research studies that are the focus of this thesis. Before delving into the theoretical models about the successful ageing process, this chapter attends to a number of issues that are needed to situate this thesis in the wider context of the cognitive ageing literature. At the outset, a brief account of the process of population ageing will highlight the importance of research on adult development. Next, a review of age categorisation systems that are currently used for adult populations will underscore the need for more collaboration within developmental psychology. This will be followed by a discussion of the developmental stage of midlife which is the least understood period of the human lifespan in psychology. The chapter then continues with an overview of the findings from the Seattle Longitudinal Study (SLS). The SLS provides an account of ageing-effects on cognition throughout the adult lifespan including midlife. The findings from the SLS underscore the need for the research presented in this thesis. Finally, this chapter will review the main theories that explain the ageing process. Specific attention will be given to *successful ageing* and assertions made by lifespan psychologists. Successful ageing is an important concept within lifespan psychology in general, and within the context of this thesis. A considerable part of this chapter will therefore be devoted to the definition and usage of this concept within cognitive ageing research.

1.1 The Population Ageing Process

Population ageing is the process by which older individuals progressively become a larger part of a given total population (United Nations [UN], 2002). In recent years it has become common knowledge that the world's population is rapidly ageing. On a global scale, the observed population of older individuals (60+) rose from 205 million in 1950 to 606 million in 2000 (UN, 2002). The UN estimates that the number of

individuals in this age-category may reach the 2 billion mark by 2050. In New Zealand, the 2001 census reported 450,426 individuals (12% of the entire population) to be aged 65 or over, and it is estimated that by 2026 this age-group may include almost one million people – a fifth of New Zealand's total population (Statistics New Zealand [SNZ], 2009).

Change in life expectancy is the most significant cause for this shift towards an increasingly ageing population. Life expectancy is, by definition, the average number of years that a person born in a particular year may expect to live (Santrock, 2008). Life expectancy at birth in New Zealand increased from 54.0 to 75.2 years of age for females, and 50.4 to 69.5 years of age for males between 1876 and 2004 (SNZ, 2006). This change in life expectancy can be attributed to economic and technological innovations resulting in improvements in sanitation, nutrition, and medicine rather than changes in the genetic makeup of the population (Olshansky, 1995).

1.2 Age Categories in Ageing Research: A Scientific Dilemma

The ageing-related literature in psychology has grown exponentially over the last few years and the age categorisation systems that have been proposed are numerous. Among the categories that are currently in use to describe adult age-groups are 'young-adults', 'adults', 'young middle-aged adults', 'middle-aged adults', 'old middle-aged adults', 'young-old adults', 'old-old adults', 'oldest-old adults', 'young elderly', and the 'old elderly'. Age ranges associated with these categories may vary considerably between writers and overlap between categories is common. As an example, the category of 'young elderly' is often used to describe individuals aged between 60 and 75, while other writers may use the same category for individuals aged 60-80, 65-80, or 65-75 (Stuart-Hamilton, 2000). Although this flexibility may be convenient for individual studies, the lack of consensus creates enormous difficulties in terms of comparability of research findings. Part of the problem in specifying age categories is that there is no particular point in time at which a person becomes elderly or old. All "age groups" are essentially socially constructed and formulated within a given economic, social, and political context and are therefore subject to change over time (Finch, 1986). Thus, at first glance, it may seem sensible to adjust age categories to changing historical contexts. However,

chronological age still remains *arbitrary* and therefore specific age thresholds are of questionable scientific status (Stuart-Hamilton, 2000).

Alternatively, it has been suggested that a shift of focus from chronological age to functional capacity may be a viable solution to better understand the ageing process (Nussbaum, 1997). In an effort to do so, gerontologists have developed the concept of biological or functional age (these terms can be used interchangeably). Biological age has become an important concept in gerontological research. Consider two individuals that may be of the same chronological age but, at the same time, they may differ considerably in the level of senescent deterioration. Many experts on ageing thus prefer to categorise age-groups in terms of function rather than chronological age (Santrock, 2008). Birren (1999) clearly indicates that the goal of developmental ageing theory and research should be "…to replace chronological age with variables that reflect the *causes* of change we initially identify as being closely related to chronological age" (p. 460).

A review of the literature by Anstey, et al. (1996) identified more than 170 biological markers that have been used to establish biological age in previous research. Among these markers are sensorimotor, cognitive, psychosocial, behavioural, anthropometric, biomedical, physiological, and dental variables. The idea that drives this type of research is to identify those variables that a) vary with time, b) provide an index of the degree of senescent deterioration, and c) can be measured in relatively non-invasive manner. The review concluded that the usefulness of functional age research depends on the level of relevance that the chosen bio-markers have to specific functional outcomes. So far no single bio-marker has been identified that can provide an accurate estimation of a person's biological age. Because of this, researchers organise varieties of bio-markers to developed mathematical models that estimate biological age. However, because of the absence of reliable standards by which such models can be evaluated, there is much disagreement about the validity of these estimations. As Masoro (1999) points out, without appropriate standards for testing the validity of biological markers, their use is questionable at best. Consequently, it may be concluded that, in terms of validity, both chronological and biological age are problematic indicants of the ageing process. Despite this, the growing body of knowledge in ageing-related research would qualitatively improve if at least an age-band consensus could be agreed upon.

1.3 Midlife: A Developmental Stage of Stability and Change

Historically, developmental psychologists have focused their attention on ageing processes that occur during the phases of childhood and adolescence. Within the past four to five decades, this historical trend has changed, and research into adult development is on the increase. Much of the research effort in this area has focused on later life, and when the entire lifespan is considered, a scarcity of midlife research becomes apparent (Staudinger & Blunck, 2001). In terms of chronological age, midlife is no exception to the general age-band confusion as conceptualisations of the midlife period range from 20 to 40 years (Lachman, 2004). In the context of this thesis, midlife is defined as the period of life between 40 and 65 years of age. This 25 year period was chosen on the basis that it is the most common conception of midlife (Lachman, Lewkowics, & Peng, 1994; Lachman & James, 1997), which allows for the maximum level of comparability with data from the existing literature.

It has been argued that, if the roots of ageing could be identified in midlife, some of the changes in biological and psychological functioning that occur in later life may be delayed, minimised, or even prevented (Lachman, 2004). Similarly, Martin and Zimprich (2005) suggest that the relatively high levels of cognitive skills in midlife may constitute an ideal time for preventive measures to be applied as the high level of performance increases the likelihood of training gains. Such arguments clearly stress the importance of midlife research and the important effects that such research may have on the well-being of the elderly. It is certainly conceivable that knowledge about cognition in midlife may lead to viable prophylactic treatments that may prevent more serious cognitive difficulties during later life stages.

Several factors are important when midlife is considered as a developmental phase that is qualitatively different from young and old age. To start with, midlife and younger and older ages are considerably different with respect to everyday demands. Schooler (1999) argues that the demands placed on school children and the challenges associated with retirement are hardly comparable to challenges that individuals in midlife face in their daily work and family environment. Specifically, in terms of cognitive development, younger age is characterised by formal education and homogeneous environments such as school classes and peer groups (Espy, Molfese, & DiLalla, 2001),

whereas in old age, cognitive development increasingly depends on physiological factors such as sensory and sensorimotor functions (Baltes & Lindenberger, 1997). Cognitive development in midlife on the other hand, largely depends on individual environments (Sternberg, Grigorenko, & Oh, 2001). Kirlik and Bisantz (1999) for example showed that different work environments have differential effects on the development of cognitive skills.

Despite the unique qualities of midlife, relatively little research has been conducted to explore this life stage. There may be a number of reasons for this. One reason is that the chronological age boundaries of midlife are even more difficult to define than the periods of childhood, adolescence, and old age (i.e., ranging from 20-40 years). In addition, while age has been found to be a useful predictor for children's abilities, it is generally not such a salient marker of adults' development (Baltes, Rees, & Lipsitt, 1980; Neugarten & Datan, 1996). The dearth of research on midlife development may also be influenced by the relative scarcity of developmental milestones and problems that are observed during earlier and later periods of development (Staudinger & Blunck, 2001). Finally, it is also possible that research interest is hampered by the fact that midlife is the period of human development where inter-individual variability is most prominent, resulting in a particularly heterogeneous population (Moen & Wethington, 1999). Whatever the reason is for the dearth of midlife research, more scientific attention is needed to understand this life stage.

In light of the recent trends in population ageing, the interest in understanding ageing effects on cognitive functioning has increased. One of the most comprehensive examinations of the life span trajectories of cognitive functioning is the ongoing Seattle Longitudinal Study (SLS; Schaie, 1996). The SLS is a cohort sequential study examining adult cognitive functioning from young adulthood (i.e., early 20s) to very old age (i.e., 90s). The study began in 1956, and since, participants' cognitive performance is assessed at a 7-year interval. At each testing cycle, participants from prior cycles are retested. In addition, a new sample is drawn at each cycle, which means that the entire study so far contains approximately 6000 participants who have been studied for 42-, 35-, 28-, 21-,

14- and 7- year intervals. The SLS has been designed to examine intra- and inter-individual as well as intergenerational differences in basic areas of cognitive functioning and various other domains. For the present purposes, a discussion of six basic mental abilities (e.g., Vocabulary, Verbal Memory, Numerical Ability, Spatial Orientation, Inductive Reasoning, and Perceptual Speed) that are part of each SLS assessment phase will suffice.

The six cognitive functions discussed here represent a person's ability as follows: A person's ability in vocabulary provides a measure of the competence level to understand ideas expressed in words. The assessment of verbal memory indicates a person's level of ability to encode, store, and recall meaningful language units such as word lists. The number category signifies a person's ability to perform simple mathematical computations such as addition, subtraction, and multiplication. A person's ability in spatial orientation tasks represents the ability to visualise, and mentally manipulate, stimuli in two- and three-dimensional space. The measurement of inductive reasoning skills reveal a person's level of ability with respect to recognising and understanding patterns and relationships within a problem and the ability to solve the problem accordingly. A measure of perceptual speed indicates a person's ability to make quick and accurate discriminations between visual stimuli.

Figure 1.1 shows the longitudinal change that has been observed for these six abilities within the context of the SLS. As can be seen, the period of peak performance for all cognitive abilities except perceptual speed lies between the ages of 40 to 60 years of age. In addition, Figure 1.2 illustrates that the cognitive abilities show relative stability during midlife. However, considering the mean changes in these intellectual functions, it is to be noted that the patterns of increase, decline, and stability observed in the SLS and other investigations are accompanied by substantial intra-individual variability (Martin & Zimprich, 2005). Thus, contrary to the views of many, cognitive abilities do not peak during young adulthood but during middle-age (Schaie, 1996). These findings are consistent with the idea that midlife may constitute an ideal time for preventive measures to be applied as the high level of performance would increases the likelihood of training gains (i.e., Martin & Zimprich, 2005).

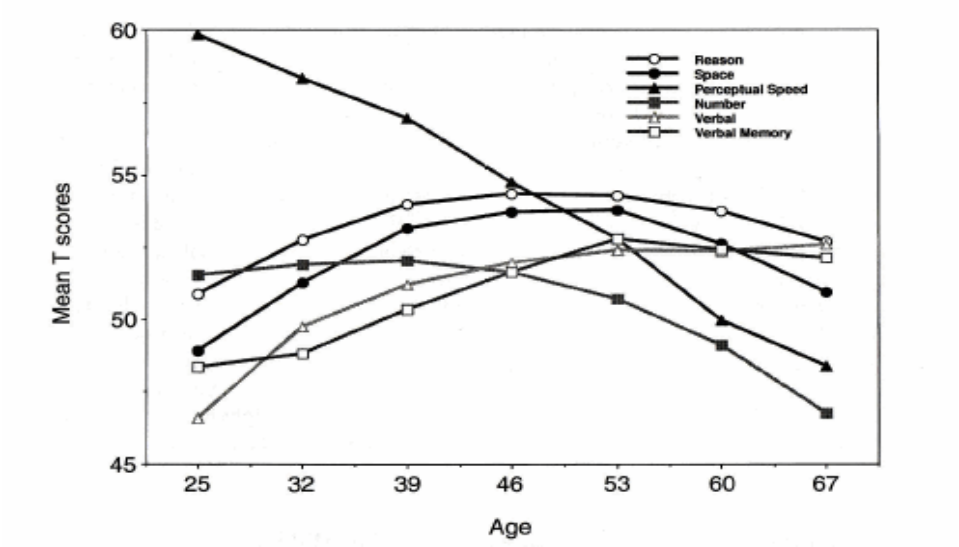

Figure 1.1: Longitudinal change in six basic cognitive abilities across adulthood (reproduced from Willis & Schaie, 1999).

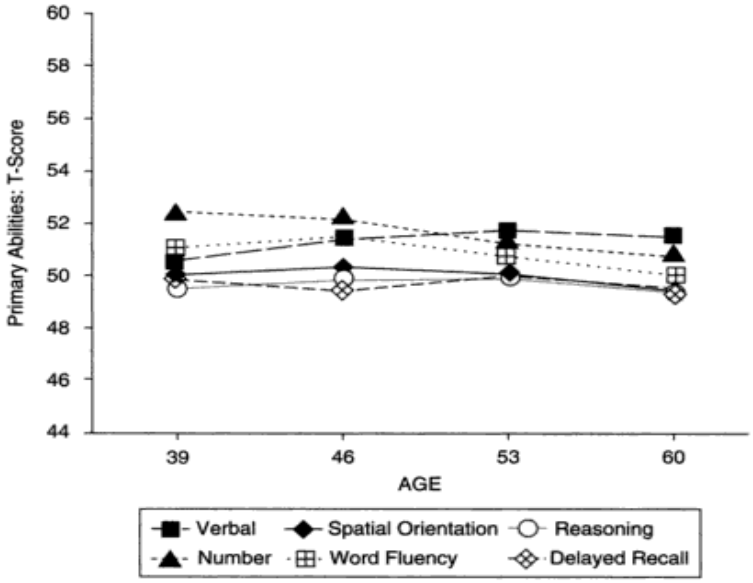

Figure 1.2: Longitudinal stability in six basic cognitive abilities during midlife (reproduced from Willis & Schaie, 2005).

1.4 Theories of the Ageing Process

At the most basic level, gerontologists distinguish between biological and psychological models of the ageing process. Generally, biological models differentiate between two phases of life: growth and ageing (Smith & Bondi, 2008). Biological models are based on the observations that most organisms usually go through a period of growth that results in maturity, which is then followed by a period of decline or senescing – the loss of functional capacity and adaptability (Schroots & Birren, 1996). Psychological theories on the other hand suggest a more continuous unfolding of events. A key assumption in lifespan psychology is that development is a continuous and lifelong process. The following section will briefly describe the most commonly espoused biological theories of ageing. This will be followed by a more detailed account of psychological theories of the ageing process. Most attention will be given to lifespan psychological theory which provides the theoretical background for this thesis.

1.4.1 Biological Perspectives on the Ageing Process

The consensus among gerontologists that senescing results from the declining force of natural selection has provided a unifying theme for biological theories of the ageing process (Cristofalo, Tresini, Francis, & Volker, 1999). Because gerontologists agree that there is no single cause for the process of senescing, it is not surprising that roughly 300 different theoretical accounts have been proposed to explain the phenomenon (Medevedev, 1990). As this wealth of theoretical propositions is beyond the scope of this chapter, the focus here will be on a limited number of theories which are commonly espoused at the present time. Among these most popular theoretical accounts of the senescing process are cellular clock theory, free-radical theory, mitochondrial theory, and hormonal stress theory, which will now be outlined.

Cellular clock theory was proposed by Leonard Hayflick (1977) who argued that human cells can divide a maximum of about 75 to 80 times. Recent research has shown that the reason for this cell division limit is most likely due to the shortening of telomeres, which are DNA sequences that cap chromosomes (Shay & Wright, 2006). Each time a cell divides, the telomeres are shortened and after about 75 to 80 divisions their length is reduced to an extent that disables the cell from reproduction. Free radical theory, another

microbiological theory, states that while cells metabolise energy, they also produce unstable oxygen molecules which are known as free radicals. Free radical theory holds that these free radicals ricochet inside the cell and damage the cells structures and DNA and thus speed up the ageing process (Frisard & Ravussin, 2006). Related to this theory are the processes described in mitochondrial theory which posits that the damage caused by free radicals initiates a perpetuating cycle were the oxidative damage impairs mitochondrial function, which in turn results in increased production of free radicals. Proponents of this theory therefore suggest that the decay of mitochondria is the primary factor in the ageing process (Capri, Salvioli, Sevini, Valensin, & Celani, Monti, et al., 2006). Finally, hormonal stress theory focuses on the body's endocrine system rather than cell structures as most salient aspects of the ageing process. Advocates of this theory maintain that ageing of the endocrine system results in lower resistance to stress which in turn results in an increasing vulnerability to disease (Finch & Seeman, 1999; Parson, 2003).

The Spectrum of Cognitive Functioning in Later Life

While minor changes in memory are universally recognised as a normal aspect of the ageing process, some forms of memory change are indicative of more serious neurodegenerative diseases such as dementia (Tuokko & Hultsch, 2006). In an age where large parts of the population live well beyond the life expectancy of earlier historical periods, it is imperative to identify those at risk of developing the more severe forms of neurodegenerative diseases. From a biological perspective, extensive research efforts have resulted in the identification of a number of ageing-related cognitive impairment categories that fall short of a diagnosis of dementia. A useful integration of these classifications into a spectrum of cognitive functioning in later life was provided by Rediess and Caine (1996). These authors identified five categories that best describe a spectrum of cognitive functioning. The categories are (1) successful or optimal ageing; (2) age-related cognitive decline (ARCD; American Psychiatric Association [APA], 1994) and age-associated memory impairment (AAMI; Crook, Bartus, Ferris, Whitehouse, Cohen, & Gershon, 1986); (3) age-associated cognitive decline (AACD; Levy, 1994) and mild cognitive impairment (MCI; Smith, Petersen, Parisi, & Ivnik, 1996;

Zaudig, 1992); (4) mild neurocognitive disorder (MND; APA, 1994) and (5) mild to severe dementia. Table 1.1 provides a brief description of the criteria for each of these categories. Although these categories describe qualitative differences, overlap in terms of biological and psychological functioning is substantial (Brayne & Calloway, 1988; Von Dras & Blumenthal, 1992). Thus, in terms of cognitive functioning, the biological model of senescing provides a very narrow definition of successful ageing - one that reserves this category exclusively for individuals who are relatively free from age-related cognitive decline.

The biological perspective, while concentrating on senescing processes, fails to account for the positive changes and growth processes that may take part during the ageing process. Baltes and Carstensen (2003) outline how the narrow focus of the senescing account may limit our understanding of the concept of successful ageing. They argue that the use of normative outcomes (1) pays little attention to population heterogeneity, (2) fails to acknowledge the social construction of old age, and (3) ignores the potential for multiple outcomes and the diverse standards of success. Ryff (1989) was one of the first authors to point out that, besides decline, increasing age may also be associated with positive functions such as self-acceptance, positive relations with others, autonomy, control over one's environment, purpose in life, and personal growth. Lifespan psychology defines successful ageing as a developmental process that may or may not be accompanied by age-related disease or decline, and the following sections will explore a lifespan psychology perspective of the ageing process.

Table 1.1: The spectrum of cognitive functioning in later life

	Successful cognitive ageing	**ARCD and AAMI**	**AACD and MCI**	**MND**	**Dementia (mild to severe)**
Description	Minimal Cognitive changes	Normal age-related cognitive changes	Below average for age peers without functional impairment	Below average for age peers with functional impairment; deficit in at least two cognitive domains	Deficient memory and at least one other cognitive domain affected; associated functional impairment
Psychometric features	Above average compared to age peers; within normal range for younger adults	Above or within the average range for age, but below mean for younger adults on selected tests	Memory or other cognitive function 1-1.5 *SD* below age peers; impaired retention is most typical	Performance on tests of at least two cognitive areas 1-1.5 *SD* below age peers	Performance on memory tests and tests of one other cognitive area 1-2 *SD* below average age peers
Functional status	Active, independent, working, or have active retirement	Active, independent, may work or have active retirement	Independent	Needs some assistance in daily activities or has discontinued some normal daily activities	Clearly impaired social and occupational functioning

Source: Reproduced from Tuokko and Hultsch (2006). Notes: ARCD: Age-related cognitive decline; AAMI: Age-associated memory impairment; AACD: Age-associated cognitive decline; MCI: Mild cognitive impairment; MND: Mild neurocognitive disorder).

1.4.2 Lifespan Psychology: Perspectives on the Ageing Process

Developmental theories in psychology were traditionally influenced by psychoanalytic approaches. The earliest Freudian ideas suggested that human development, in terms of personality, is formed in childhood and remains stable throughout the entire lifespan. Carl Jung (1933) proposed a midlife-shift theory. Jung's central proposition was that after childhood and adolescence, individuals enter the early stage of adulthood which is characterised by self-generated needs, ambitions, and attention to one's own agenda of success and failure. Individuals then proceed into mid-adulthood, characterised by individuals' reflection upon personal agendas and those of significant others. Jung postulated that the most important considerations in this stage of life are self-reflection, relations with others, and introspections concerning the meaningfulness of life (Friedrich, 2001). Also drawing on psychoanalytic theory, Erik Erikson (1982) proposed eight stages of psychosocial development. His central hypothesis resolves around different crises and primary tasks that have to be dealt with in each developmental stage. Erikson argued that cultural and contextual influences are major influences on a person's development of a sense of self.

Modern day psychology favours lifespan perspectives which conceptually tend to be most in line with Erikson's theory (Friedrich, 2001). Lifespan psychology examines ontogenetic development from conception to death and focuses on the study of constancy and change in behaviour. Such perspectives only emerged during the 1970s and in 1987 Paul Baltes laid out seven key assumptions that are vital for the understanding of the ageing process from lifespan perspectives:

1. ***Development is a lifelong process.*** Ontogenetic development is a lifelong process, and no particular period is superior or inferior in regulating the nature of development. Both continuous (cumulative) and discontinuous (innovative) processes are relevant during the entire life span development.
2. ***Development is multidirectional.*** The directionality of change that is evident in ontogenesis is marked by diversity - even within the same domain of functioning. During particular developmental stages,

particular systems of behaviour may increase while other systems evince marked decreases in level of functioning.

3. ***Development involves both gain and loss.*** The process of development may neither be conceptualised as an unadulterated growth process that results in maturity, nor as a pure senescing process. Instead, development is always constituted by an interaction between gain (growth) and loss (decline).
4. ***Development is characterised by lifelong plasticity.*** Psychological development is marked by much intra-individual plasticity. Depending on individuals' experiences and life conditions, development may take many forms.
5. ***Development is shaped by its historical-cultural context.*** Ontogenetic development varies substantially with the given historical-cultural conditions. The developments of the socio-cultural conditions which are embedded within the historical period have profound impact on ontogenetic development.
6. ***Contextualism is the paradigm of development.*** Ontogenetic development must be understood in the context of age-graded, history-graded, and non-normative influences. The meta-theoretical principles of contextualism can be used to examine each of these influences.
7. ***Understanding development requires multiple disciplines.*** In order to understand psychological development, it must be considered in an interdisciplinary context. Viewing life span perspectives from multidisciplinary perspectives is necessary to arrive at the complete picture of development from conception to death.

Multilevel and Systemic Analysis of the Ageing Process

Based on the above assumptions, Baltes and colleagues (i.e., Baltes 1997; Baltes, Lindenberger, & Staudinger, 1997; Elder, 1997; Featherman, 1983) have proposed a framework that can be used to examine lifespan development. This framework emphasises the multiplicity of phenomena that may occur during the ageing process, and

draws attention to the importance of considering different levels of theorising and analysis when age-related changes are considered (Baltes, Freund, Li, 2005).
Four different levels of analysis at which examinations of the ageing process may take place are suggested (see Table 1.2). Taken together, these four levels are proposed to facilitate an understanding of the bio-cultural and psychological constraints as well as opportunities inherent in the human developmental processes. Beginning at the lowest level, the most distal and general determinants of development are considered. From there on, the levels of analyses progressively move toward more proximal and specific psychological factors and mechanisms of the ageing process. It is postulated that each level of analyses uses the former level(s) as prefiguring structure, and together they represent a framework of interconnecting propositions, theoretical specifications, and empirical facts (Baltes, et al., 2005). The research presented in this thesis focuses on the third and fourth level of analysis. As each level is based on the assumption of the previous level, the following sections will describe all four levels in more detail to substantiate the argument for the theoretical model chosen for this thesis.

Table 1.2: The four levels of analyses of psychological ageing

Level	Focus of Analyses
1	Interaction between biological and cultural evolution
2	Age-dependent, differential allocation of resources to functions of growth, maintenance, and regulation of loss
3	Meta-theoretical examinations of successful psychological ageing Example: Selective Optimisation with Compensation
4	Specific theories of psychological ageing: Examining specific functions and domains (i.e., cognition, intelligence, personality etc.)

(Adapted from Baltes et. al., 2005)

Level 1: The bio-cultural architecture of lifespan development.

This most fundamental level of analysis concerns the connections between biological and cultural evolutionary perspectives. Considering old age, an assumption is

made that renders the basic architecture of biological and cultural co-evolution as necessarily incomplete in two respects. Firstly, biological and cultural evolution are never completed but constitute ever evolving processes, and secondly, the model acknowledges that, relatively speaking, old age is young and therefore evolution (biological and cultural) has had little opportunity to fully evolve and optimise the architecture for the later phases in life (Baltes & Smith, 1999).

Baltes and colleagues account of the ageing process posits that the incompleteness of the bio-cultural architecture of development increases with age. This proposition is based on three basic assumptions (Baltes, 1997; see Figure 1.3): 1. Increasing age results in a reduction of evolutionary selection benefits; 2. There is a positive association between increasing age and the need or demand for culture; and 3. There is an age-related decrease in the efficiency of culture. The first assumption is based on findings from population geneticists who argue that evolution neglects old age in favour of young age (Baltes & Smith, 1999). Such arguments are supported by the fact that the evolutionary selection process primarily operates during the first half of life to ensure reproductive fitness (Partridge & Barton, 1993). The second and third assumptions are based on a definition of culture that encompasses psychological, social, material (environmental and technological), and symbolic (knowledge-based) resources that humans have produced over the millennia (Baltes, Staudinger, & Lindenberger, 1999).

The age-related increase in the need or demand for culture can be linked directly to the recently accelerated population ageing process. The fact that humans, over historical times, have attained progressively higher levels of functioning and longevity can largely be attributed to cultural attainments in economics and technology rather than genetic evolution (Olshansky, 1995). In addition, increased need or demand for culture in older age can directly be linked to the first assumption of age-related decrease in natural selection benefits. As biological potential declines with age, the need or demand for culturally based compensations to generate and maintain high levels of functioning increase (Baltes & Smith, 1999).

The third assumption of age-related decrease in cultural efficacy must be examined in light of large interindividual and inter-domain differences in the rate and onset of the decline in efficacy (Baltes, Staudinger, & Lindenberger, 1999). Despite the

high level of heterogeneity, older age has generally been shown to be associated with increased demand for practice and time necessary to attain the same learning gains that are attained in younger age. Sometimes, high levels of performance, as they are observed in younger adults, may not be attainable by older adults even after extensive training (Baltes, 1997). Together, these three interrelated conditions form the most basic architecture of the lifespan dynamics between biological and cultural aspects of ontogenetic development. Baltes, Staudinger, and Lindenberger (1999) proposed that any given psychological theory of life span development needs to be consistent with these overarching propositions.

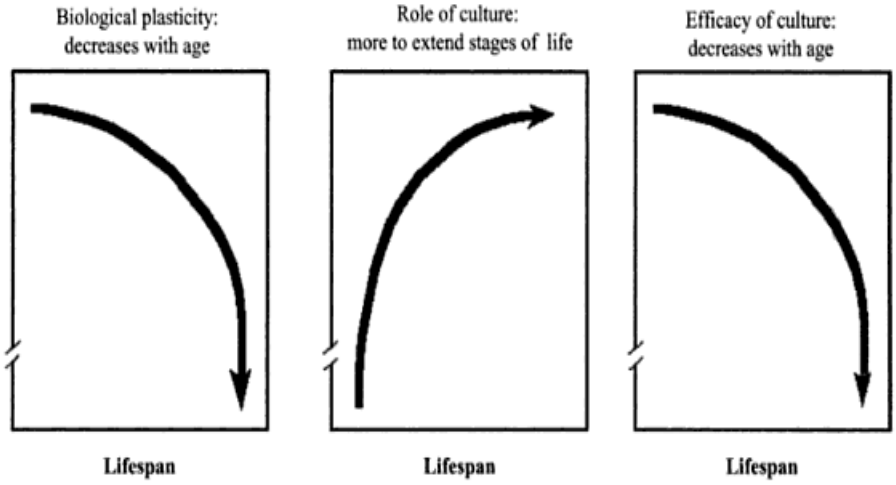

Figure 1.3: The incomplete architecture of human ontogeny: Dynamics between biological and cultural evolution across the life span (reproduced from Baltes, et al., 2005).

Level 2: Lifespan trajectories of resource allocation to functions of growth, maintenance, and regulation of loss.

The second level of analysis of the ageing process explicates the dynamic interplay between gains and losses throughout ontogenetic development, and the differential allocation of resources to functions of growth, maintenance, and loss regulation. In this context, resources refer to factors that aid a person's interaction with the environment and may include bio-genetic characteristics (i.e., general activity level), psychological characteristics (i.e., self-efficacy), or socio-cultural characteristics (i.e.,

education) (Freund & Baltes, 2000). The three elements of growth (i.e., attainment of higher levels of functioning), maintenance (i.e., sustaining and/or recovering satisfactory levels of functioning), and loss management (i.e., dealing with loss when attempts to maintain and recover functions are unsuccessful) have been proposed to be the most generic developmental goals that require resources.

Gain/loss dynamic

In line with arguments of bio-cultural co-evolution, the second half of life is characterised by more losses than gains. This shift necessitates increased need for resources to maintain equilibrium and compensate for losses as people get older. Although the overall balance between gains and losses becomes less positive with age, gains still need be considered part of the ageing process. In fact, it has been suggested that there can be no loss without gain in ontogenetic development (Baltes & Smith, 1999). Research has shown that the gain/loss dynamic is present in various aspects of the ageing process. For example, Carstensen (1993) showed that the observed reduction in absolute size of older peoples' social networks is usually accompanied by gains in the emotional involvement and amount of time spent with significant others. Similarly, losses that result in higher levels of dependency on others may result in the generation of new forms of personal control (M. M. Baltes, 1996). What particular instances may be considered a loss or a gain itself may change with age; involves subjective as well as objective criteria; depends on the cultural as well as historical contexts; and may vary according to the specific criteria of functional fitness or adaptivity used (Baltes & Smith, 1999).

Relative allocation of resources to developmental goals

Lifespan psychology postulates a life-span script for the allocation of resources to generic developmental goals. In this context, goals are defined as "desired states that people seek to obtain, maintain, or avoid" (Emmons, 1996, p. 314). During the ageing process, resources are differentially allocated to the goals associated with growth, maintenance, and regulation of loss (Baltes, 1997).

During the early stages of lifespan development, most resources are allocated to functions of growth - both physiological and psychological (Friedrich, 2001). The use of resources for maintenance is most characteristic in young- and middle-adulthood and, to no surprise, older age has been shown to be associated with higher levels of demand in resources for both maintenance and loss regulation. Ebner, Freund, and Baltes (2006) showed this life span trajectory of resource allocation among a sample of young, middle-aged, and old adult (see Figure 1.4).

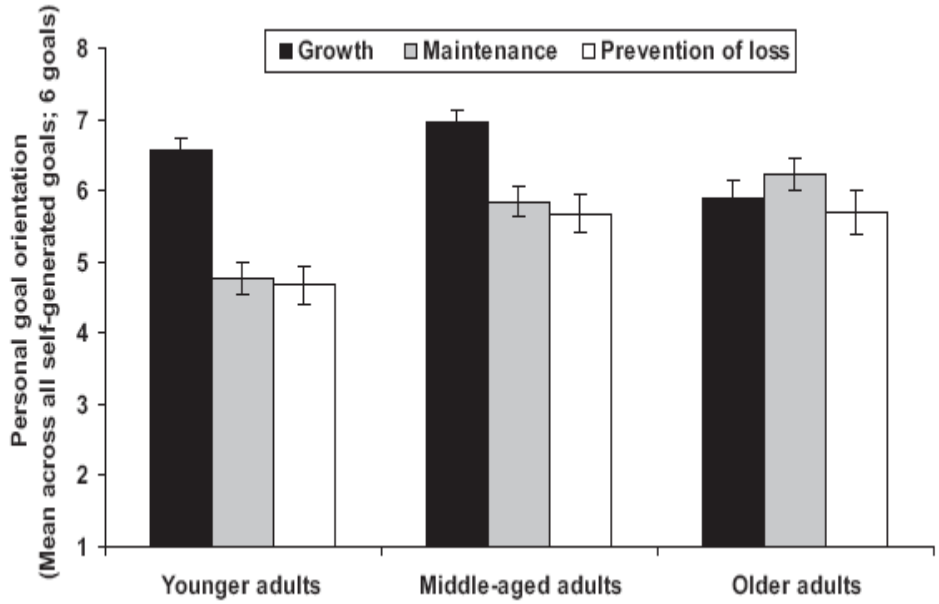

Figure 1.4: Age differences in resource allocation across the adult life span (reproduced from Ebner, et al., 2006)

Level 3: A meta-theory of successful ageing: Selective optimisation with compensation.

During recent years, emphasis has shifted from formulating criteria for successful ageing to outlining the processes involved (Ouwehand, de Ridder, & Bensing, 2007). While the biological perspective provides useful normative criteria of successful ageing, it fails to address idiosyncratic psychological processes that are inherent to the ageing process. Based on the assumptions of level one and two, the meta-theory of Selective Optimisation with Compensation (SOC) was postulated (M. M. Baltes, & Carstensen, 1996; Baltes, 1987, Baltes & M. M. Baltes, 1980, 1990, Baltes, Dittmann-Kohli, &

Dixon, 1984). The plasticity of age-related change in bio-cultural contexts is the basis for SOC. Although SOC is not considered to be the only theory that fits within the overall frame, it has specifically been designed to complement the first two levels of analyses (Baltes, et al., 2005). SOC provides a useful framework to specify how individuals manage biological, psychological, and social changes (i.e., opportunities *and* constraints) that may occur in human development. The processes that facilitate simultaneous maximisation of gains and minimisation of losses are considered to be the defining aspect of successful development (Baltes, et al., 2005). More specifically, SOC is an efficacious strategy to manage resources between the three functions of growth, maintenance, and the regulation of loss. The definition of selection, optimisation, and compensation may differ considerably depending on the chosen theoretical framework and domain of functioning under investigation.

Selection, optimisation, and compensation can be defined as follows. Selection denotes the course of action involved in developing, choosing, and committing oneself to goals. However, because causal and functional origins of selection may differ, a further conceptual distinction is made between elective selection (ES) and loss-based selection (LBS). According to Freund and Baltes (2002), ES denotes individuals' focus on desired goals (e.g., a person might commit herself to her career instead of her hobbies until the desired level of professional functioning is achieved). LBS on the other hand, denotes a consequence of experiencing a loss in goal-relevant means which threatens the maintenance of a given level of functioning in a specific goal domain (Freund & Baltes, 2002). The primary function of LBS is the reconstruction of one's goal system. As an example of LBS, an athlete may commit herself to becoming a chess player when a permanent injury in her leg prevents her from athletic activity. Optimisation denotes the employment of means aimed at goal achievement; and compensation denotes the employment of means that are necessary to maintain a given level of functioning when confronted with a loss in goal-relevant means (Freund & Baltes, 2000). Thus, from this perspective, successfulness may be viewed as the level of goal attainment in a given domain that is important to the individual. Examples of personal developmental goals may range from the maintenance of physical or cognitive functioning, generativity, ego-integrity, self-actualisation, or social connectedness (M. M. Baltes & Carstensen, 2003).

This definition broadens the criteria of successful ageing considerably as it is not restricted (and limited) by the definitions that are purely based on normative cut-off scores that categorically define the spectrum of cognitive functioning described in Table 1.1. Table 1.3 illustrates behavioural categories that reflect SOC strategy use (i.e., Baltes, M. M. Baltes, Freund, & Lang, 1995). When the lifespan trajectory is considered, middle-aged individuals evidence the highest and most convergent endorsement of selection, optimisation and compensation (see Figure 1.5).

While the SOC model has received empirical support (which is described in more detail in Chapters 6 and 7), it has been criticised on the basis that it exclusively focuses on individuals *reactions* to ageing-related change while potential *proactive* coping mechanisms are not considered (Ouwehand, et al., 2007). Proactive coping "consists of efforts to build up general resources that facilitate promotion of challenging goals and personal growth" (Greenglass, 2002, p. 38). Ouwehand and colleges (2007) argue that, while elective selection and optimisation may to some extent require individuals to think proactively and future oriented, the SOC model does not explicitly acknowledge individuals proactive efforts to avoid future loss of resources. Proactive coping strategies may include strategies such as strategic planning (i.e., anticipation of potential undesirable changes) and instrumental support seeking (seeking advice or social support). While proactive coping has thus far not been examined within the SOC framework, proactive and preventative strategies may be a useful addition to the SOC model of successful ageing (Ouwehand, et al., 2007).

Table 1.3: Behavioural instances of selection, optimisation, and compensation (reproduced from Baltes, 1997)

Selection	**Optimisation**	**Compensation**
Elective	Attentional focus	Increased attentional focus
Specification of goals	Effort/Energy	Increased effort/energy
Goal system (hierarchy)	Time allocation	Increased time allocation
Contextualisation of goals	Practice for skill	Activation of unused skills/ resources
Goal commitment	Acquiring new skills/ resources	Acquiring new skills/ resources
Loss-based	Modelling successful others	Modelling successful others who compensate
Focusing on most important goal(s)	Motivation for self-development	Use of external aids/ help of others
Search for new goals		Therapeutic intervention
Restructuring of goal hierarchy		
Adaptation of standards		

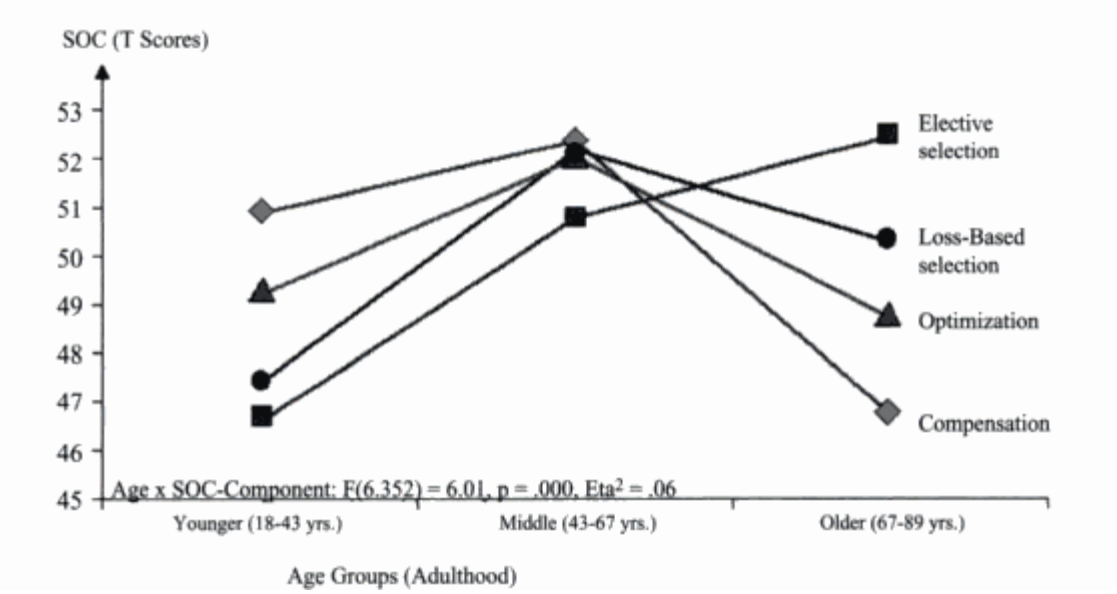

Figure 1.5: Age differences in SOC endorsement (SOC = selection, optimisation, compensation [reproduced from Freund & Baltes, 2002]).

Level 4: Fluid cognitive mechanics and crystallised cognitive pragmatics: Cognitive abilities and domain specific theories.

The fourth level of analysis focuses on the specific functions of cognitive and intellectual development and the theories of how these functions may be affected by the ageing process. It has long been recognised that intellectual abilities (e.g., memory, reasoning, perceptual speed, verbal knowledge and fluency) may be differentiated in terms of 1) Fluid cognitive mechanics - reflecting neurobiological based processes, and 2) Crystallised cognitive pragmatics – reflecting experience and culture-based knowledge (e.g., Baltes et al., 1999; Horn, 1982). Research has shown that the trajectories of these two domains of cognitive development show differential patterns over the lifespan. Cognitive mechanics have been shown to decline earlier than the culturally-based cognitive pragmatics (Baltes et al., 2005). Specifically, abilities that reflect mechanic processing such as spatial orientation, or perceptual speed, show linear decline during adulthood and this decline may accelerate in very old age. In contrast, crystallised pragmatic abilities such as verbal knowledge, or certain types of numerical abilities, often show weak or even positive age-relations up until very old age (Baltes, et al., 1999).

It has been suggested that domain-specific *acquired* (i.e., culturally-based) knowledge may provide ageing individuals with a domain-bound ability to withstand the consequences of age-related losses in fluid cognitive mechanics (Baltes, et al., 1999). This potential to attenuate negative age effects is of paramount importance to the process of cognitive ageing and is in line with the assumptions of the SOC model of lifespan development described above. The notion that the acquisition of crystallised knowledge may lower the losses in fluid cognitive mechanics is reflected in the most basic assumption of all cognitive training efforts for ageing populations, including the research conducted in this thesis. Specifically, in memory training it must naturally be assumed that the effects of training (i.e., culture-based knowledge acquisition) compensates for the age-related losses in cognitive mechanics such as neuronal degeneration.

1.5 Conclusion

Considering that the peak performance levels as well as the onset of cognitive decline occur during midlife, the dearth of research pertaining to this population is

surprising. A number of authors have argued that cognitive development during midlife can have important effects on the well-being in later life stages. It is certainly conceivable that knowledge about cognition in midlife may lead to viable preventative and prophylactic treatments that may prevent more serious cognitive difficulties during later life stages. In light of the population ageing process, it is particularly important to determine how psychology may contribute to the well-being of the rapidly ageing population.

This chapter provided a discussion of some of the fundamental issues within modern developmental psychology and explicated the theoretical model that was chosen for the research presented in this thesis. It was shown that the assumptions made by lifespan psychologists have led to the proposition that analyses of the ageing process can usefully be thought of in four qualitatively different levels including frameworks that consider global developmental processes in terms of 1) bio-cultural co-evolution, 2) ageing-related gain/loss dynamics, 3) the meta-theoretical assertions of selective optimisation with compensation and 4) more specific developmental theories that pertain to particular aspects of the ageing process (e.g., memory and ageing). Together these four levels have been shown to represent a framework of interconnected propositions, theoretical specifications, and empirical facts and this general framework is reflected in the research presented in this thesis. The specific levels of analyses that pertain to this thesis is the meta-theory of Selective Optimisation with Compensation (SOC) which is applied to the domain of memory, representing the fourth level of analysis proposed by Baltes and colleagues (2005)

A second objective of this chapter was to determine what it means to age successfully. Thus far, an interdisciplinary agreement about the criteria for these relatively new concepts remains elusive. Biological perspectives favour narrow definitions of ‘successfulness’ which are solely based on normative outcomes. One of the key determinates of success from this perspectives are psychometric profiles that are above average when compared to individual of the same age. Lifespan psychology adopted a more individualised approach to the concept of successful ageing, paying more attention to the issues that are often neglected by purely senescing accounts of the ageing process. The meta-theory of selective optimisation with compensation describes

successful ageing as the simultaneous maximisation of gains and minimisation of losses within a given domain of functioning. From this point of view, the definition of successfulness is further refined to the level of goal attainment with respect to one's personalised, domain specific goal structure. It is postulated that, in an effort to attain developmental goals, individuals regulate their available resources by means of orchestrating the processes of selection, optimisation, and compensation (SOC). Thus, phrased in terms of this thesis, the fundamental hypothesis is that individuals who endorse SOC strategies adapt better to age-appropriate memory decline than those who do not. Memory is the principle functional domain of interest to this thesis and in order to further develop the arguments that have lead to the rationale of this thesis, the following chapter will tread the phenomenon of memory. Chapter two will provide the reader with an overview of memory systems and how these systems are differentially affected by the ageing process.

CHAPTER II
THE INFORMATION PROCESSING APPROACH TO MEMORY AND AGEING: MEMORY SYSTEMS AND MECHANISMS OF AGEING-RELATED CHANGE

The previous chapter showed that most cognitive functions (including certain aspects of memory) are at a lifetime peak during midlife, and consequently, midlife is also the life-stage in which cognitive functions are beginning to decline. It has been found that reports of forgetfulness are considerable throughout the adult lifespan. Almost three quarters of individuals in midlife consider themselves to be forgetful, and as much as 70% worry about their future memory performance. This provided the rationale for this thesis and the critical objective is to provide individuals in midlife with the means to reduce forgetfulness and memory-related worrying. The first objective of this chapter is to provide an overview of memory system theories and related processes such as attention and learning which are of critical importance to memory systems. A number of other cognitive processes and mechanisms have been found to differentially effect age-related changes in memory systems. Most notably, the mechanisms of processing speed and processing resources, inhibitory functions, and cognitive control have been implicated as determinants of age-related changes in memory. This chapter will present the research that shows how these processes and mechanisms may affect memory performance as people age.

In order to establish what course of action provides the most effective approach to memory enhancement, it is necessary to evaluate the theories that have thus far informed research and practice in memory enhancement and rehabilitation. As will be shown in chapter 9, the memory intervention programme presented in this thesis emphasises clients understanding of the functions and processes of the memory system. The current chapter therefore also provides the theoretical and research background for the educational aspect of the intervention programme.

The second objective of this chapter is to review memory assessment procedures. In order to answer the research questions of this thesis, it is of crucial importance to conduct memory assessment that is valid and reliable and includes both objective and

subjective indicants of individuals' memory status. Some of the most reputable instruments that are used to measure different aspects of memory systems are reviewed. Finally, in order to situate this thesis in the context of the existing theory and research, the chapter will close by providing an overview of memory research that pertains specifically to midlife.

2.1 System Theories of Memory

There is now abundant evidence that memory is not a singular function and that different functions may be differentially affected by the process of ageing (e.g., Luo & Craik, 2008). Among the most influential theories of memory systems that have been proposed are the tripartite model proposed by Atkinson and Shiffrin (1968), and Tulving's (2000) model that postulates five separate memory subsystems and both models will be reviewed in the following sections.

2.1.1 Atkinson and Shiffrin's three part model

At the most basic level, memory has long been differentiated by the length of time over which a person can retain information. Atkinson and Shiffrin's model reflects this time/retention distinction. Their model consists of three independent stores including sensory memory, short term memory (STM), and long term memory (LTM). The basic proposition of this model is that the three parts of the system may store information for different periods of time. Sensory memory stores environmental information over a very brief period of time (i.e., < 1sec.), and in order for the information to be recalled at a later time, the information must be transferred to the STM store. The STM temporal storage capacity is slightly longer than sensory memory. Miller (1956) proposed that regardless of whether the units to be remembered are numbers, letters, or words, the span of STM is usually seven plus or minus two "chunks". Chunks are what Miller described as the basic unit of short term memory, that is, units of information that are strongly associated with one another (Maltin, 2009). More recent research suggests that the "pure capacity" of STM is more likely to be around four items of information when chunking of information is not an option (Cowan, 2005).

The Atkinson-Shiffrin model explicates how STM is vital for learning and memory. However, because the model could not explain how STM influences other cognitive tasks, the concept of STM as a unitary store was reconceptualised as working memory (WM; Baddeley & Hitch, 1974; Baddeley, 1986). The WM conceptualisation of the STM store defines a multi-part system that temporarily holds and manipulates information as cognitive tasks are performed (Maltin, 2009). According to Baddeley, WM contains four distinct functions, including the phonological loop (PL), the visuospatial sketchpad (VSSP), the episodic buffer, and the central executive. The PL holds speech-based information. The PL consists of two parts, a passive phonological store, which is responsible for auditory speech processing, and an articulatrory control processor, responsible for sub-vocal articulation of visually presented words (Baddeley, 1990). As the name suggests, the VSSP processes visual and spatial information. The VSSP allows for coherent storage of information in relation to objects physical appearance and their relative position in space (Logie & Della Salla, 2005). The VSSP can also be subdivided into two components: the visual cache – storing information about visual form and colour, and the inner scribe – dealing with information about spatial location and movement (Logie, 1995).

The episodic buffer is postulated to act as intermediary store that is capable of integrating the information of the PL and VSSP subsystems (Baddeley & Wilson, 2002). As each of the subsystems uses very specific codes (e.g., verbal and visual/spatial), the episodic buffer performs the integration of these multimodal types of information and information from LTM. This integration enables the central executive to perform more general processing on the integrated episode of information (Baddeley, 2000). Additional tasks that are performed by the central executive are the focusing of attention, the planning of strategies, and the coordination of behaviour (Baddeley, 2001; Reuter-Lorenz & Jonides, 2007).

In contrast to the relatively restricted capacities of sensory memory and WM, LTM has a much larger capacity, containing a life-time worth of memories of experiences and accumulated information (Maltin, 2009). LTM, like WM, can be subdivided into more specific types of memory. On the most basic level LTM may be subdivided into episodic memory, semantic memory, and procedural memory. Tulving

(1972) was first to argue for the distinction between episodic and semantic memory. According to Tulving, episodic memory refers to storage and retrieval of events or episodes that occur at a particular time at a particular place. In contrast, semantic memory refers to more general knowledge, including knowledge of words and factual information (Maltin, 2009). Procedural memory, on the other hand, refers to the learning and memorising of cognitive and motor skills which manifests itself over a wide range of situations (i.e., driving a car or using a computer) (Schacter, Wagner, & Buckner, 2000).

2.1.2 Tulving's five-part model

A more recent systematic differentiation of types of memory was proposed by Tulving (2000). While this model has much in common with earlier systems, a number of additional functions are proposed. Tulving's model differentiates between five memory systems that deal with different types of information, and are differentially vulnerable to the effects of ageing (Luo & Craik, 2008): procedural memory, the perceptual representational system (PRS), WM, semantic memory, and episodic memory. While the PRS is similar to sensory memory, its functions are more specific. The PRS is characterised as a compilation of *domain-specific* modules that are responsible for information processing on the form and structure of words and objects (Schacter et al., 2000). It is hypothesised that the primary role of the PRS is to coordinate perceptual priming. That is, because of the PRS, our ability to identify an object should change in accordance with specific prior encounter with that object (Tulving & Schacter, 1990).

While the concepts of WM, semantic and episodic memory are identical to earlier models, the procedural memory module of Tulving's system is postulated to have more functions then earlier models suggested. In Tulving's system, procedural memory is responsible for learning associative relationships (i.e., simple conditioning) as well as motor and cognitive skills. Procedural memory covers a wide range of cognitive and motor skills (i.e., driving a car, playing the piano, counting, spelling, reading, etc.) which are associated with automatic responding, and thus, conscious recollection of the initial learning episode are not required for the module to function (Craik, 2000).

2.2 Age-related changes in memory: The information processing perspective

A number of theoretical accounts implicate information processing mechanisms as the cause of age-related change have been proposed. The mechanisms that are postulated to account for change are, general slowing (Salthouse, 1996), reduced processing resources (Craik & Byrd, 1982; Craik, 2006), loss of inhibititory functions (Hasher & Zacks, 1988), and lack of cognitive control (Jacoby, 1991).

The fundamental assumption in the general slowing theory is that age-related differences in memory are due to a reduction in processing speed (Salthouse, 1985). On the basis of path analysis, Salthouse (1996) argues that, if the processing speed factor is controlled for, then the independent contribution of age on memory performance is relatively weak.

The reduced processing resources model proposed by Craik and Byrd (1982) accounts for memory decline on the basis of reduced attentional resources. Here, the argument is that memory is largely a function of the depth and elaboration of the initial encoding and therefore depends on attentional resources. These authors argue that memory deficits among the elderly reflect impaired comprehension of the material to be remembered (Craik, 1983).

With respect to the functions of inhibition, Hasher and Zacks (1988) proposed that the ageing process results in less efficient inhibitory mechanisms which, in turn, result in memory deficits. They argue for inhibition mechanisms that serve two distinct functions with respect to memory performance: 1) Inhibition prevents irrelevant information to interfere with working memory, and 2) Inhibition is responsible for the removal of no-longer-relevant information from working memory.

Jacobys' (1991) argument, that control mechanisms are most pertinent to memory difficulties, is based on the important distinction between automatic and consciously controlled memory processes. This account of age-related memory decline differentiates between recollection (controlled) and familiarity (automatic) types of memory processes. Research has shown that the efficacy of controlled processes is declining while automatic processes are not subject to such age-related decline (Jennings & Jacoby, 1993).

In summary, general slowing, reduced processing resources, loss of inhibitory functions, and lack of cognitive control are the main theories of the information

processing perspective of age-related memory decline. Research has shown that these mechanisms account for different aspects of research findings in the memory and ageing literature (Luo & Craik, 2008). The following sections will examine how the memory system described by Tulving may be differentially affected by the information processing mechanisms.

2.2.1 Procedural Memory

Numerous research studies have shown that procedural memory is unaffected by the ageing process (Craik, 2000). Procedural memory is usually tested by priming paradigms. A meta-analysis by Laver and Burke (1993) indicated that priming effects are actually greater in older people. Because conscious recollection of the learning episode is not required for procedural memory to function, procedural memory is best described in terms of implicit rather than explicit memory. The reliance on automatic and implicit processes may be the factor that protects procedural memory from the effects of ageing.

2.2.2 Perceptual Representational System

Given the apparent intactness of the procedural memory module in older people, it is reasonable to assume that the PRS module (representing an earlier phase of the memory process), should also be relatively unimpaired. However, little research has been conducted to examine ageing effects on PRS functioning (Craik, 2000). Generally, it has been noted that performance levels in tasks that require PRS functioning are relatively stable across the adult life span (Luo & Craik, 2008).

2.2.3 Working Memory

If the task is to actively manipulate stored information, or rapidly switching between information storage and processing of further incoming information, age effects are substantial (Craik, 2000). Studies have shown that, while age effects on WM can be observed from early adulthood onwards (i.e., Craik, Morris, & Gick, 1990), age-related decrements in WM performance vary with the level of task complexity (Salthouse, Mitchell, Skovronek, & Babcock, 1989). Older adults are less impaired on simple WM

tasks such as digit span, but may experience more difficulties when storage and processing tasks have to be managed simultaneously.

Considering the different components of the WM system, age-related slowing has been observed for every sub-system of the model (Dror & Kosslyn, 1994). This ageing-related decline within the entire WM structure can be seen as a weakness of the WM concept. Salthouse (1994, pp. 537) argues that "…to the extent that significant age differences exist in each of the hypothesized components, this framework may not be very useful for differentiating, and potentially localising the source of, age-related effects in working memory". It has been suggested that, even though the WM model may account for overall age-related variations, the absence of differential effects between the subsystems renders model parsimony for WM to be low (Andrade, Baddeley, & Hitch, 2003). Overall, research indicates that age-related decline in WM capacity may affect many other cognitive activities including LTM encoding and retrieval, syntactic processing, language comprehension, and reasoning (Zacks, Hasher, & Li, 2000).

2.2.4 Semantic Memory

Research has shown that age-related decrements in semantic memory tasks are dependent on the level of specificity of the information to be retrieved. Research shows that there are no age differences in general knowledge sections of IQ tests (Salthouse, 1991). Similarly, when the ability to use semantic information is considered, age differences are low to nonexistent (Light, 1992; Light & Burke, 1988). Despite the absence of age decrements in general semantic memory, studies that investigate semantic memory for highly specific information show a different picture. For example, one of the largest age effects in semantic memory can be observed for the memory of names. Numerous studies investigating both, the learning of new names, and the retrieval of familiar names show a marked age effect (Cohen & Burke, 1993). An investigation by Cohen and Faulker (1986) showed that recall of a person's name was significantly lower than recall of other biographical information (e.g., occupation, hobbies, place names) when participants were asked to recall previously learned biographical sketches of fictitious characters. This lower capacity to recall a person's name was observed within all age groups (i.e., young, middle-aged, and old) but older individuals performed

significantly worse than individuals from the other two age groups. In addition, the recall of familiar names such as those of famous persons, are less likely to be recalled than the persons occupation when presented with a picture of the individual (Hanley & Cowell, 1988). Similarly, within the context of everyday life, memory for names was found to be the largest category in terms of the tip of the tongue phenomenon, and this was particularly true for older people when compared to young and middle-aged individuals (Burke, MacKay, Worthley, & Wade, 1991). Thus, considering both laboratory and naturalistic studies, age effects on semantic memory have been shown to depend on the specificity of the information to be recalled.

2.2.5 Episodic Memory

Research has produced abundant evidence for relatively high levels of age-related decline in episodic memory when compared to any of other memory modules. Considering the age-related effects on episodic memory decline, three aspects are particularly noteworthy: (1) the onset of the decline commences relatively early in life (i.e., in young adulthood), (2) the decline progresses in a continuous rather than a discrete fashion, and (3) the rate of the decline is relatively slow (Bäckman, Small, & Wahlin, 2001). These age effects were evident in two large-scale studies that considered participants from middle-age through to 80 years of age (Nillson et al, 1997), and from the late teens trough to the mid-90s (Salthouse, 1998) respectively. Numerous other research studies have shown that deficits in episodic memory may be reduced if supportive contextual cues are provided at the encoding stage (i.e., provision of strategy instructions or organisational framework), or the retrieval stage (i.e., provision of cues, hints, reminders, etc.) (Craik, 2000). Retrieval of information is most reliable if cues are provided at both, encoding and retrieval stages. However, it has been shown that, relatively speaking, younger people benefit more from encoding and retrieval cues than older people (Park & Shaw, 1992).

2.3 Memory in Midlife

Dixon, De Frias, and Maitland (2001) point out that midlife is hardly ever an organised theme or keyword in either the memory or the ageing literature. In general, most memory research compares old adults with young adults, assuming that midlife performance falls somewhere between these two age groups. Dixon, et al. (2001) conducted a literature review on studies of midlife memory that considered the five comprehensive memory systems described by Tulving described above. This review, spanning a period of 22 years (1977 – 1999), identified only 124 papers that considered midlife population. With respect to Tulving's system, the review showed that 51% of the research focused on episodic memory, 17% on semantic memory, 17% on working memory, 12% on the perceptual representational system, and only 2% focused on procedural memory. Lavigne and Finley (1990) reviewed memory research in the areas of free recall, cued recall, recognition, prose recall and memory strategy use. Findings from this review indicate a steady decline in memory performance throughout midlife but stable use of strategy use.

In general, studies on self-reported forgetfulness show a systematic age-related increase in everyday forgetting, and besides age, having a close relative who suffers from dementia, and feelings that one is not in control of one's memory functioning where also powerful predictors of forgetfulness (i.e., Ponds, Commisaries, & Jolles, 1997; Commisaries, et al. 1998). Research has shown that 34% of healthy middle-aged individuals considered themselves to be forgetful (Commisaries, Ponds, & Jolles, 1998). When people are asked to ascribe reasons for their forgetfulness, younger people are more likely to attribute forgetfulness to external causes, while older people blame internal causes (Commisaries, et al., 1997). Thus, as people get older, their beliefs tend to shift from perceptions of forgetfulness as manageable and reversible to beliefs that memory deficits are inevitable, uncontrollable, and age-related.

In order to examine the nature of everyday forgetfulness across the adult lifespan, Cavanaugh, Grady, and Perlmutter (1983) conducted a diary study. Cavanaugh et al. categorised diary entries of forgetting and ranked categories from most to least often occurring: 1) Names, 2) Facts, 3) Objects, 4) Appointments, 5) Locations, 6) Routines, and 7) Numbers. Although the data showed a general increase in absolute memory

failures with age, there were no significant age-related differences in the relative frequency of specific types of memory failures. In addition, the memory diaries and debriefing interviews provided some insight into the situations in which forgetfulness most likely to occur. Participants reported that forgetting is most likely to occur when they are tired or required to recall information that was not recently used. In addition, being out of "normal" routines, lacking concentration, and being under stress were also often reported as cause for forgetfulness.

Findings from studies that examine the relationship between objectively measured memory impairment and self-reported forgetfulness are mixed. Some cross-sectional studies suggest that memory complaints are indicative of actual impairment (i.e., Jonker, Geerlings, & Schmand, 2000), while others show little or no association between objective and subjective impairment (Jonker, Launer, Hooijer, & Lindeboom, 1996; Riedel-Heller, Matschinger, Schork, & Angermeyer, 1999). A similar pattern is found in longitudinal data with some studies showing associations between subjective and objective memory performance (i.e., Dufouil, et al., 2005, Martin & Zimprich, 2003) and others show no association (Frerichs & Tuokko, 2006; Jorm, Christensen, Korten, Henderson, Jacomb, & Mackinnon, 1997). Thus, the nature of the relationship between objective and subjective memory impairments is complex and more research is needed to clarify mixed findings. A number of studies have suggested that memory complaints may be more closely tied to contextual factors and individual differences rather than objective memory status (i.e., Pearman & Storandt, 2004; Bolla, et al, 1991). These factors are discussed in more detail in chapter three which focuses on contextual determinants of memory performance.

Memory compensation efforts also vary with age. Self-report studies have shown that older people are more likely than younger people to report the use of external aids to support their memory. A study by de Frias, Dixon, and Bäckman (2003) indicated that this age-related increase may be compensatory in nature. They argue that individuals use external strategies in an attempt to compensate for the subjectively perceived increase in everyday memory failures. Dixon, de Frias, and Bäckman (2001) showed that even among a healthy middle-aged population, external strategies are the preferred method to compensate for perceived memory decline.

Overall, it is evident that the vast majority of memory research focuses on the young and old adult population while midlife performance is largely unexamined and assumed to lie between performance levels of younger and older cohorts. Bearing in mind that memory problems are the most prevalent cognitive complaint among the middle-aged, this population requires further research attention.

2.4 The Construct of Memory: Conceptual Distinctions and Fundamental Processes

The previous sections reviewed the various components of memory systems. On another level, memory has long been differentiated in terms of explicit and implicit types of remembering (i.e., depending on whether a person is aware or unaware of how and where a memory was created, it will be classified as either explicit or implicit respectively). An additional distinction is made between retrospective and prospective types of memory – specifying whether the memory involves past or future events. Together, these four concepts are essential to the understanding of the information processing approach to memory.

Considering that these components are highly specialised, it is conceivable that they depend on different processes for optimal functioning to occur. The memory intrinsic processes of encoding and retrieval are vital to an understanding of the functions of memory. Similarly, the memory extrinsic processes of attention and learning are also essential processes that facilitate memory functioning. These processes all interact with each other in order to form and recollect memories. Given that an understanding of memory systems and processes is a vital aspect of the educational aspect of the intervention presented in this thesis, the current section will examine how the different types of memory and memory-related processes are affected by the ageing process.

2.4.1 Explicit and implicit memory

The differentiation between explicit and implicit cognitive processing was introduced to distinguish between processing in the presence or absence of awareness. Graf and Schacter (1985; p. 501) argued that "implicit memory is relevant when performance on a task is facilitated in the absence of conscious recollection; explicit memory is relevant when performance on a task requires conscious recollection of

previous experiences". Reflecting this distinction, tasks that test explicit memory typically examine recognition or recall of information, whereas the measurement of implicit memory usually focuses on repetition priming effects (i.e., observing accuracy and/or reaction times for repeated stimuli) in lexical decisions, naming, word identification, and fragment completion tasks. Observed dissociations between performances on these tasks resulted in the conventional agreement of the explicit/implicit memory system differentiation.

In terms of age-effects, research has shown that older people are more likely to be impaired on tasks requiring explicit memory process, while implicit memory processes are relatively unaffected by age (Light & Singh, 1987). When the entire adult life span is considered, the decline in explicit memory is gradual, and mid-life performance lies between performance of younger and older individuals (Schugens, Daum, Spindler, & Birbaumer, 1997). Although the explicit/implicit memory differentiation has a long research history, recent arguments indicate that such a differentiation as unwarranted. Reder, Park, and Kieffaber (2009) maintain that the unconscious nature of implicit memory does not necessitate a system separate from conscious, explicit memory. They argue that most tasks (explicit and implicit) use the same memory representation and that the important differentiation is whether the task requires the formation of a novel association rather than different levels of consciousness. Reder and colleagues base their argument on the Source of Activation Confusion Model (SAC). SAC explains why the task-based differentiation is viable while the explicit/implicit system view is not. While these authors acknowledge that the SAC model requires refinement, the argument against the explicit/implicit system differentiation is solid and would appear to require theoretical as well as research attention in the future.

2.4.2 Retrospective and prospective memory

Retrospective memory (RM) refers to remembering information from the past. Examples for RM in everyday life are retrieving a phone number from memory, recalling the content of yesterday's meeting, or recognising a familiar place. Prospective memory (PM) on the other hand, can be defined as the ability to remember future events (Winograd, 1988). PM involves remembering to do things at the right time and is thus a

vital aspect of everyday memory and functioning (Driscoll, McDaniel, & Guynn, 2005). Problems involving PM are particularly prevalent among the ageing population (Maylor, 1996), and strategies to cope with PM impairments usually take the form of external memory aids (Maylor, 1993; see chapter 4 for a review of memory compensation strategies).

2.4.3 Attention, Learning and Memory

The phenomena of attention, learning, and memory are inextricably linked. Briefly, attention determines whether information is processed; learning refers to a relatively stable change in behaviour that is the result of experience; and memory refers to the retention of processed information (Berkson, 1993). From the moment a stimulus is first perceived, a complex interaction between attention, learning, and memory begins. The following section will explicate these interactions with a particular focus on how the processes of attention and learning impact on memory performance during adult development.

Attention and memory.

Before specific theories of attention can be considered, a crucial distinction needs to be made between selective attention (SA) and divided attention (DA). SA is usually studied by presenting people with two or more stimuli at the same time, with the instructions to attend or respond to only one stimulus. DA, as the name suggests, is studied by presenting people with two or more stimuli and instructing them to attend or respond to at least two of them. A number of theories about the effects of attentional processes on memory have been proposed. The most commonly espoused explanations are theories about early and late selection filters, perceptual load theory, and feature-integration theory.

Early selection filter theories postulate that attention selects and filters information on the sensory level *before* it has been analysed for meaning (Hunt & Ellis, 2004). Late selection theories state that attention operates on information that has already been represented in STM and LTM. The earliest account of attentional processes was proposed by Broadbent (1958). Broadbent's theory is an early selection model. He argues

that two or more stimuli simultaneously gain access to a sensory buffer, and on the basis of physical characteristics, only one stimulus will be allowed to proceed into the selection filter. Because of the limited capacity of the STM store, the selection filter prevents further processing of the stimuli that remained in the sensory buffer. While this theory readily accounts for basic research findings such as the cocktail party effect (i.e., Cherry, 1953), it cannot explain findings were participants did recall information of seemingly unattended information (i.e., Underwood, 1974). Such finding lead Treisman (1960) to propose an attenuation filter to replace the notion of the selection filter. Thus, instead of selecting only one stimulus for further processing, the attenuation filter selects one stimulus for complete processing while at the same time attenuated analysis of other stimuli proceeds in parallel. This theory accounts for knowledge about the unattended information which Broadbent's theory could not explain. A similar proposition was made by Deutsch and Deutsch (1963) who argue that *all* stimuli are fully analysed for meaning but only the most important stimuli enter STM and LTM. According to this late selection model there is no filter mechanism between the sensory register and STM, and thus, selective attention is assumed to operate on STM and LTM representations rather than sensory input (Hunt & Ellis, 2004).

Lavie (2000) argued that attentional processes are determined by the magnitude of the perceptual load rather than the properties of the selection filters. Perceptual load theory holds that whether information is selected early and late depends on the total amount of incoming information. The main hypothesis here is that, depending on the task at hand, the most important incoming information is prioritised in terms of attentional resources. In addition, Lavie argued that any spare attentional capacity is automatically allocated to less important information, and thus perceptual load theory maintains that the humans' total attentional capacity is always used to the maximum.

Finally, feature-integration theory (Treisman & Gelade, 1980) provides a viable account of how SA and DA are managed by attentional processes. According to this theory, SA and DA form a continuum and thus attentional resources are often allocated somewhere between these two extremes. Research has shown that this continuum view of attention is a plausible explanation (Bundesen & Habekost, 2005), and feature-integration theory provides an important framework, especially for visual attention (Matlin, 2009).

Depending on whether attention is divided at the encoding or retrieval stage, differential effects of DA on memory have been observed. Specifically, an investigation by Fernandes and Moscovitch (2000) indicated that dividing attention at encoding leads to relatively more interference than dividing attention at retrieval. Although, the general findings described by these authors can be observed across the adult lifespan, the ability to divide attention has been shown to decline with age (Whiting, 2003). Besides this general age-effect, Whiting showed that the comparatively larger DA effect at encoding can be accounted for by the type of encoding processing that is used. Elaborative encoding (i.e., generating words) resulted in fewer DA costs than shallower encoding (i.e., reading words), and this was true for both younger and older adults.

Learning and memory.

At the outset of a discussion of learning in the context of memory, it must be stressed that there cannot be "memory" without "learning" (Deluca & Chiaravalloti, 2003) and vice versa as deficiencies in memory have been shown to decrease learning efficiency (Kyllonen & Christal, 1990). The most commonly espoused definition of learning states that learning involves "...a relatively permanent change in behaviour brought about by practice or experience" (Lachman, 1997, p. 477). Thus, keeping in mind that definitions of memory emphasise that previously experienced information is retained, the differentiation between the concepts of learning and memory seems, at first glance, vague. Despite the close association of learning and memory, experimental and clinical literature on these processes branched into independent lines of investigation and cross talk is the exception rather than the rule (Deluca & Chiaravalloti, 2003). The question of where learning ends and memory begins can be determined by the type of research that is conducted to investigate the phenomena. Learning research essentially focuses on the acquisition stage of information processing while memory research focuses on the retention of information over time. This distinction, which is solely based on different research paradigms, has been the most reliable conceptual differentiation of learning and memory (Lutz, 2005).

2.4.4 Memory Encoding

When memory processes are considered, a fundamental distinction is made between encoding and retrieval. The first stage of the process of memory is always encoding, which refers to the learning phase of memory where new information is introduced to the memory system. Craik and Lockhart (1972) proposed the level of processing model where it is assumed that attentional and perceptual processes at the learning or encoding stage determine what information is stored in LTM. Their main hypothesis was that deeper levels of processing should produce higher rates of recall. The level of processing effect is one of the most robust research finding in the memory literature. People are three times more likely to remember a word if they had previously answered questions about the meaning of the word rather than questions about the physical appearance of the word (Craik & Tulving, 1975). Since this initial investigation, scores of research studies have confirmed the level of processing effect (i.e., Roediger & Gallo, 2001).

Deeper processing has been found to facilitate recall because of two factors that operate only within deeper levels of processing: distinctiveness and elaboration. Distinctiveness refers to aspects of a stimulus to be remembered that are different from other existing memory traces. It is argued that the more distinct the memory traces are, the more likely it is that the memory will be retrieved. A study by Eysenck and Eysenck (1980) showed this distinctiveness effect where distinctive phonemic encoding of words resulted in better recall than conventional phonemic encoding. Elaboration, on the other hand, requires rich and meaningful processing that might link the stimuli to be remembered to other related material or concepts (Smith, 2006). By varying the complexity of sentences to be completed by participants, Craik and Tulving (1975) showed that rates of recall increased with sentence complexity, indicating that more context resulted in higher levels of elaboration.

2.4.5 Memory Retrieval

Retrieval refers to the process of recovering previously encoded information (Tulving & Craik, 2000). There are two distinct types of retrieval: recall and recognition. Recall refers to retrieval (cued or uncued) of information from the memory store.

Recognition refers to retrieval of information from memory after experiencing it again. Both types of retrieval to some degree depend on retrieval cues and several theories have been proposed to explain the role of cues. Tulving and Thomson (1973) proposed the encoding specificity principle of memory which provides a framework for understanding how contextual information affects memory encoding and subsequent retrieval. The principle states that memory is enhanced when the same contextual information is available at encoding and retrieval. Numerous studies have shown this effect. For example, an investigation by Smith, Glenberg, and Bjork, (1978), found that participants' recall of information was better when retrieval and encoding occurred in the same room and lower if different rooms were used. Kenealy (1997) found that participants had significantly greater difficulties in retrieval of information when they encoded and retrieved in different states of mood relative to participants who encoded and retrieved in the same mood states. Thus, the encoding specificity principle has been used to show that memory retrieval may be dependent on the context or the cues that are provided at the encoding stage.

A concept similar to the principle of encoding specificity is transfer-appropriate processing. A study by Morris, Brandsford, and Franks (1977) showed that, as expected, deeper-level semantic judgements during encoding resulted in better performance than shallow-level rhyme judgements when tested on a standard recognition test. The importance of transfer-appropriate processing became apparent in a condition where the memory test required decisions about whether the words rhymed with the initially encoded words. Under these conditions, rhyme judgements were shown to result in better performance than semantic judgements. Wohldmann and Bourne (2005) argue that the concepts of transfer-appropriate processing and encoding specificity may be usefully joined in the singular concept of *procedural reinstatement.* Procedural reinstatement involves retention that depends on the degree to which the procedures used during encoding are reinstated at the retrieval stage. Overall, this line of research suggests that Craik and Lockhart's level of processing framework must accommodate the concept of procedural reinstatement to arrive at a more precise description of the encoding and retrieval processes.

2.5 Memory Assessment

The distinction between basic memory skills and everyday memory has a long history within psychology. The vast majority of traditional memory research has been conducted in the laboratory. Neisser (1978) argued that the traditional, laboratory-based approach to memory lacks ecological validity. Neisser argued that ecologically valid memory research could only be achieved by studying everyday memory, that is, memory phenomena in the natural context of the real world. Other authors strongly opposed this view, for the reason that everyday memory research could not be generalised due to the lack of experimental control (Banaji & Crowder, 1989). Because there is something to be said for both arguments, more recent efforts combine these two research methodologies.

Within laboratory-based neuropsychological memory assessment the areas of interest are attention, auditory and visual learning and memory, immediate and delayed memory, working memory and information processing speed. In contrast, everyday memory assessment concerns memory domains that are more pertinent to daily life situations, including tasks such as story recall, shopping list recall, memories for activities planned for the week, memories for faces and names, or memories for places (Cavalini, Pagnin, & Vecchi, 2003). Despite the conceptual differences, research has shown that basic memory abilities strongly correlate with abilities in everyday memory (Allaire & Marsiske, 1999). However, in terms of age-related decline, deficits in laboratory tasks do not necessarily imply the breaking down of everyday memory functioning in old age (Verheagen, Marcoen, & Goossens, 1993). A given phenomenon may be examined via both methodologies, and such hybrid methodological approaches have become commonplace in memory research (Cohen, 1996).

Within the discipline of neuropsychology the focus shifted toward a greater emphasis on understanding the relationship between the results of basic neuropsychological assessment and the individuals' performance on everyday tasks (Spooner & Pachana, 2006). Crook and Youngjohn (1993) argue that a close collaboration between basic and everyday memory research is essential for the development of treatment and rehabilitation programmes that aim to reduce memory disorders. They argue that everyday memory research provides both a precise behavioural description of the clinical problems, as well as the assessment tools that determine

treatment efficacy. The next sections will cover the assessment methods that are used by neuropsychological and everyday memory research.

2.5.1 Types of memory assessment

Three distinct approaches to neuropsychological assessment have been identified, including behavioural neurology; the use of neuropsychological batteries; and the individual-centred normative approach (Beaumont, 2008). Behavioural neurology focuses on the qualitative analysis of problem behaviour rather than psychometric and statistical profiling of individuals' cognitive performance. The advantage of this approach is that only relevant assessment instruments are selected. However, this method is the least standardised procedure which also heavily depends on the skill level of the clinician (Beaumont, 2008). The test battery approach is based on the comprehensive assessment of a multitude of functions and relies to a large degree on a formal psychometric approach. Batteries such as the Luria-Nebraska Neuropsychological Battery can differentiate between cognitive deficits by examining the client on each of the cognitive variables of interest (Emilien, Durlach, & Antoniadis, 2004). The disadvantages of this approach are that time and effort may be wasted by administration of tests that are not relevant to the specific problem of the individual; and specific problems may be overlooked if the test battery does not include a particular instrument of relevance (Davison, 1974). The individual-centred normative approach stands between the two approaches already described (Beaumont, 2008). Here the emphasis is on the selection of standardised tests that are relevant to the individuals' presenting problems. The disadvantage of this approach is that the assessment may be fragmented and unsystematic and also depends on the skill level and insight of the individual clinician. Considering these three approaches to assessment, it has been suggested that the individual-centred normative approach may provide the most appropriate type of assessment (Beaumont, 2008). No matter what approach is chosen for assessment, a clinical interview is always considered necessary to determine the individuals' subjective experience of the given problem. In terms of memory assessment, examiners have to keep in mind that memory complaints may occur in the absence of deficient performances on objective memory tests (Riedel-Heller, Matschinger, Schork, & Angermeyer, 1999), and conversely, lack of

subjective experiences of memory difficulties may be due to lack of awareness and thus does not obviate the need for objective assessment (Lezak, 1995).

2.5.2 Neuropsychological assessment of basic memory skills

Because memory complaints are the most frequent reason for neuropsychological referral, the assessment of memory is often the central issue in a neuropsychological examination (Lezak, Howieson, & Loring, 2004). Distinguishing between a primary memory disorder and impairments of attention and/or concentration, which would impact on memory performance, is the initial challenge for the clinician conducting an examination of suspected memory impairment (Emilien, et al., 2004). Consequently, a full neuropsychological evaluation of cognitive functioning is often part of a comprehensive memory evaluation. It has been suggested that the assessment of memory should at least be preceded by an examination of attention because of its fundamental role in the memory process. If the client performs poorly on attentional tasks (i.e., digit span forward or counting backwards by 3s), a valid measure of retention is unlikely to be obtainable (Lezak, et al., 2004). Furthermore, to obtain a valid assessment of memory, assessment needs to be conducted after all sensory impairments have been corrected, as visual or hearing difficulties may impact on test performance (Maruff & Darby, 2006).

A comprehensive neuropsychological memory assessment should include (1) examination of orientation to time and place; (2) prose recall to evaluate learning and retention of meaningful information; (3) rote learning ability; (4) visuospatial memory; (5) remote memory; and (6) autobiographical memory (Lezak, et al., 2004). It is possible to examine each individual aspect of memory by itself, however to conduct thorough neuropsychological assessments, batteries of memory tests are often used. The most widely used and accepted battery today are the Wechsler Memory Scales (WMS; Wechsler, 1945) and its revised versions (Butler, Retzlaff, & Vanderploeg, 1991). The latest version - the Wechsler Memory Scale IV (WMS-IV; Wechsler, 2009) - includes eight primary memory indexes (comprised of 11 subtests) including: Auditory Immediate, Visual Immediate, Auditory Delayed, Visual Delayed, Auditory Recognition Delayed, General Memory, and Working Memory. In addition to the primary indexes, the WMS-IV includes four supplementary indexes including single trial learning, learning

slope, retention, and retrieval. The WMS-IV has been designed to provide a complete picture of individuals' range of memory functions. The battery has been normed with a sample of 1250 adults ranging between 16 and 89 years of age, which were divided into 13 different age groups. In terms of reliability, the *WMS-IV Technical Manual* states that the primary subtest scores range between .74 and .93 for all age groups. Test-retest reliability over two- to twelve-week intervals, range between .62 and .82 for individual subtests, and between .75 and .88 for the primary indexes.

Other similar examples of memory specific test batteries are the 1) Memory Assessment Scale (Williams, 1991; examining attentional focus, short-term memory, learning, and immediate and delayed memory), 2) the Camden Memory Test (Warrington, 1986; examining pictorial and topographical recognition memory, paired associate learning, and short term recognition memory for faces and words) and 3) the Denman Neuropsychology Memory Scale (Denman,1984, 1987; examining story recall, paired associate learning, memory for remote verbal information, memory for digits, figure recall, musical tones and melodies, and memory for human faces. As far as the present standards of memory specific assessment are concerned, most clinicians would opt for the WMS-IV for a comprehensive assessment of memory abilities. However, individuals' presenting problems may necessitate the inclusion (or exclusion) of specific tests and clinicians need to be sensitive to such considerations.

2.5.3 Neuropsychological assessment of everyday memory

The rationale behind neuropsychological assessment of everyday memory (EM) is to evaluate memory domains that are relevant to daily life situations and thus, EM assessment focuses on functional and ecological aspects of memory. In neuropsychological terms, ecological validity may be defined as the "functional and predictive relationship between the patient's performance on a set of neuropsychological tests and the patient's behavior in a variety of real world settings" (Sborne, 1996, p. 16). Ecological validity received little attention in neuropsychology until the late 1980s (Spooner & Pachana, 2006). Since then, the two approaches of verisimilitude and veridicality have been conceptualised in order to establish ecological validity (Franzen & Wilhelm, 1996). Verisimilitude refers to the similarity between the demands of the test

and the demands of the actual everyday environment. Veridicality, on the other hand, is determined by the degree of correspondence between the results on an assessment instrument and the scores on another measure that predicts the performance of real-world tasks (Franzen & Wilhelm, 1996). A review by Chaytor and Schmitter-Edgecombe (2003) evaluated the effectiveness of these two approaches with respect to various cognitive domains. They found that for the domain of memory, the verisimilitude approach was superior to veridicality, as tests with high verisimilitude tend to show stronger associations to everyday memory performance than their traditional counterparts. Thus, tests with high verisimilitude are better indicants of everyday memory skills than those with high vericality.

Since the late 1980s, a number of important instruments, using different methodologies and different approaches to the establishment of ecological validity, have been developed to measure EM functioning. Despite the limitations of the self-report approach, EM assessment generally involves questionnaire assessment. Numerous questionnaires have been developed to assess EM functioning, each focusing on distinct aspects of EM, and three of the most widely used forms are discussed here. Besides questionnaires, a number of objective test batteries have also been developed. This section will review both questionnaire and objective tests of everyday memory assessment.

Questionnaire assessment.

Cognitive Failures Questionnaire (CFQ; Broadbent, Cooper, Fitzgerald, & Parkes, 1982) The CFQ is a 25-item self-report inventory that asks people about minor mistakes and slips over the period of the last six months. The Cognitive Failure Questionnaire (CFQ; Broadbent, Cooper, FitzGerald, & Parkes, 1982) was designed to assess individual's proneness to committing everyday cognitive failures and based on factor analysis, Broadbent and colleagues identified a single cognitive failure proneness factor that interferes with everyday task completion. The nature of the CFQ factor structure has been subject to much debate over the last 20 years. A number of factor analytic studies have examined the dimensionality of the questionnaire and many authors have not agreed with the single factor solution proposed by Broadband et al. (1982) and

two, three, four, and five factors solutions have been proposed (e.g., Larson, Alderton, Neideffer, & Underhill, 1997; Pollina, Greene, Tunick, & Pucket, 1992; Wagle, Berrios, & Ho, 1999; Wallace, Kass, & Stanny, 2002; Wallace 2004; Rast, Zimprich, Van Boxtel, & Jolles, 2009). Comparison of the different factor structures are described elsewhere (Wallace 2004; Rast, et al., 2009). A study by Vom Hofe, Mainemarre, and Vannier (1998) indicated that the CFQ has excellent internal consistency (α = .91), and a test-retest reliability of .82 over a 2-months interval. In addition, the CFQ has been shown to possess adequate concurrent validity, by correlating well with similar measures (i.e., Absent-Mindness Questionnaire (r = .62), Everyday Memory Questionnaire (r = .64), and Cognitive Interference Questionnaire (r = .34).

Everyday Memory Questionnaire (EMQ; Sunderland, Harris, & Baddeley, 1983, 1984). Recent research showed that the EMQ, consisting of 28 items loads onto two independent factors: general memory and attentional function (Royle & Nadina, 2008). Cronbach's alpha levels for the EMQ are excellent (e.g., r = .9; Cornish, 2000). A study by Royle and Nadina (2008) indicated that the questionnaire may be reduced to a 13-item scale (EMQ-R) which also consists of two factors, named: Retrieval and Attentional tracking. These authors indicated that the EMQ-R has good discriminative properties between clinical and control groups, however, because of limited knowledge of psychometric and clinical properties they advise that further exploration of the shortened form is necessary.

Memory Assessment Clinics Self-rating Scale (MAC-S; Crook & Larrabee, 1990, 1992). Factor analytical analysis indicated that this 49-item scale consists of 21 ability-to-remember items, and 24 items that assess the frequency of memory failures. Four additional items assess the individual's self-comparison to others, comparison to the best one's memory has ever been, speed of recall, and personal concerns over memory function. Factor analysis indicated that both, the ability-to-remember and the frequency of memory failures subscales are comprised of five factors. The ability scale includes 1) Remote Personal Memory, 2) Numerical Recall, 3) Everyday Task-Oriented Memory, 4) Word Recall/Semantic Memory, and 5) Spatial/Topographic Memory. The frequency of

occurrence scale includes 1) Word and Fact Recall, 2) Attention/Concentration, 3) Everyday Task-Oriented Memory, 4) General Forgetfulness, and 5) Facial Recognition (Crook & Larrabee, 1990). Using a sample of 1106 individuals aged between 18 and 92, the authors indicated that this factor structure is stable in middle as well as late adulthood. Test-retest reliability for each of the factors consistently exceeds .80 (Crook & Larrabee, 1992).

Objective assessment of everyday memory.

The most widely used objective EM test is the Rivermead Behavioural Memory Test (RBMT; Wilson, Cockburn & Baddeley, 1985) which was designed to be "…a bridge between laboratory-based measures of memory and assessments obtained by questionnaire and observation" (Wilson, Cockburn, Baddeley, & Hiorns, 1989, p. 856). The RBMT consists of 12 subtests, each of which was designed to assess a different aspects of everyday memory tasks such as remembering names associated with faces, recalling a short story, remembering a route, remembering to ask for a hidden belonging and recalling its location, remembering to deliver a message and recognising a series of faces. The RBMT has been shown to predict EM difficulties in populations with head-injuries, Alzheimer-type dementia, post-traumatic amnesia, and individuals who suffered coma (Spooner & Pachana, 2006). However, the RBMT had also been shown to be insensitive to detect relatively minor memory difficulties in normal, healthy individuals. For this reason, deWall, Wilson, and Baddeley (1994) developed a more demanding version, the Rivermead Behavioural Memory Test – Extended Version (RBMT-E; Wilson, Clare, Cockburn, Baddeley, Tate, & Watson, 1999). deWall, et al. (1994) piloted the RBMT-E with healthy, middle-aged and elderly populations and found that the extended version has sufficient sensitivity to detect the small age-related differences in EM performance between these groups.

Given that psychometric tests such as the RBMT are given by individual examiners, subtle differences such as the administrator's voice and manner, ability to sustain rapport, experimenter bias, and rates of stimulus presentation may vary considerably. Such environmental variability may affect test performance (Lezak, 1983). For this reason, it has been suggested that computerisation of everyday memory

assessment may be a viable avenue to minimise such effects (i.e., Mayes, 1986). The Memory Assessment Clinics (MAC) Computer-Simulated Everyday Memory Battery (Crook, Johnson, & Larrabee, 1990; Crook & Larrabee, 1988) has been developed for these purposes. Studies showed that the MAC battery distinguishes between factors of everyday verbal and visual memory, attention-concentration, and processing speed (Crook & Larrabee, 1988; Larrabee & Crook, 1989). Larrabee, West, and Crook (1991) showed that the MAC battery scores of normal adults were significantly associated with self-rated memory (27.9% of shared variance), and the tests have also been shown to discriminates (88.4%) between individuals with AAMI (Folstein, Folstein, & McHugh, 1975) and persons with mild AD (Youngjohn, Larrabee, & Crook, 1992). Overall, the MAC battery covers a broad range of everyday memory functioning, and because multiple alternative forms are available, the battery has been shown to be particularly useful in clinical trials of memory enhancing drugs for ageing-related memory disorders (Sbordone & Long, 1996).

2.6 Conclusion

This chapter provided an overview of memory system theories and the information processing approach to memory and ageing. The most recent memory system proposed by Tulving differentiates between five memory modules that deal with different types of information including procedural memory, the perceptual representational system, working memory, semantic memory, and episodic memory. The information processing approach to memory and ageing has provided research that shows that these modules are differentially vulnerable to the effects of ageing. The mechanisms of general slowing, reduced processing resources, loss of inhibitory functions, and lack of cognitive control have been identified as main determinants of age-related change in memory performance across the different systems. As has been shown, ageing may also have differential impact on conceptually distinct memory types such as explicit and implicit memory or prospective and retrospective memory, as well as the processes of encoding, retrieval, learning, and attention. Thus, the information processing approach accounts for of much of the research findings that describe memory decline that relates to the ageing-process.

This chapter also examined memory assessment methodologies for both basic (laboratory-based) and everyday memory skills. It was shown that, in terms of age-related decline, deficits in laboratory tasks do not necessarily imply the breaking down of everyday memory functioning and vies versa. For this reason, comprehensive memory assessment is best informed when both types of memory are assessed. Midlife memory research indicates that self-reported everyday forgetfulness is extremely high while significant objective change does not occur until later in life. The information processing theories may be of less utility for examinations of midlife memory where cognitive performances may well be at a lifetime peak. Studies have suggested that midlife memory complaints may be more closely tied to contextual factors and individual differences rather than objective memory status. Thus, in order to understand age-appropriate forgetting in midlife, numerous other variables need to be taken into account. Chapter 3 examines individual differences and environmental factors that are known to affect memory performance.

CHAPTER III
CONTEXTUAL DETERMINANTS OF INDIVIDUAL DIFFERENCES IN MEMORY PERFORMANCE

Wide variability in memory performance is evident even within the same age cohort. For some individuals ability levels decline sharply, but for many others memory performance levels decline only slightly or not at all. While the information processing is said to account of much age-related decline in later life a major limitation to the theory is that it implicitly assumes that biological deterioration is the central determinant of age-related decline (Hess, 2005). This is at odds with psychological lifespan theory where the adaptive nature of cognition very much depends on the context in which it occurs.

As has been shown in chapter 1, lifespan theory favours a conceptualisation of ageing effects that is multidimensional and multidirectional, and therefore assumes multiple determinants of age-related changes in memory. The current chapter examines a range of contextual variables that have been shown to be powerful moderators of memory performance. Several authors has argued that contextual variables may account for more variance in cognitive change than the effects of senescing (e.g., Wilson, et al., 2002; Christensen, et al., 1999; Hultsch, Herzog, Small, & Dixon, 1999). This chapter reviews the evidence of contextual influences on interindividual change and interindividual variability. While the potential list of contextual influences on memory is likely to be of considerable size, the current chapter focuses on protective effects of education, health and life-style determinants of memory performance and motivational and cognitive factors that may affect memory performance.

3.1. Education and memory performance

It has been suggested that education plays a protective role against the development of age-related memory decline. Low education has been shown to be a risk factor for the onset of dementia and particularly Alzheimer's Dementia (AD;Stern, Gurland, Tatemichi, Tang, Wilder, & Mayeux, 1994). The cognitive reserve hypothesis (CRH) posits that there are individual differences in coping with brain pathology, and

that persons with greater cognitive reserve may be at lower risk for cognitive decline (Roe, Xiong, Miller, & Morris, 2007). CRH assumes that people with higher levels of education have greater cognitive reserves or compensatory ability than people with lower levels of education. Research has supported CRH by showing that the onset of accelerated cognitive decline in the development of dementia is delayed in individuals with higher levels of education (Hall, Derby, LaValley, Katz, Verghese, & Lipton, 2007). Results of a functional MRI study that examined age-effects on the relationship between education and brain activity during memory tasks showed that education in older adults (but not younger adults) was associated with frontal cortex activity (Springer, McIntosh, Winocur, & Grady, 2005). These findings also support CRH by showing that older adults use the frontal cortex as an alternative network to compensate for cognitive deficits elsewhere. It is therefore necessary to control for the protective qualities of education in research and rehabilitation as education has the potential to differentially effects individuals' cognitive reserves and ability to compensate for lost ability.

3.2 Health and Lifestyle-related Moderators of Memory Performance

3.2.1 Dementias

Health-related influences on memory performance have been investigated using both subjective measures and more objective indicants such as physiological data, number of hospitalisations, and number of chronic illnesses (Zacks, et al., 2000). Although subjective and objective measures have generally been shown to correlate significantly, the typical concerns about the validity of self-ratings also apply to health ratings (Salthouse, 1991). When specific diseases are considered, research has provided clear evidence for negative effect on memory performance. The most significant decline in memory performance can be seen in dementias. Dementias are "…characterized by the development of multiple cognitive deficits (including memory impairment) that are due to the direct physiological effects of a general medical condition, to the persisting effects of a substance, or to multiple aetiologies" (APA, 2000). Dementias such as Alzheimer's disease (AD) and vascular dementia profoundly affect memory performance even in the early stages of pathogenesis (Morris, 1996). Dementias have been shown to have a long

preclinical period during which memory deficits are detectable (Small, Fratiglioni, Viitanen, Winbald, & Bäckman, 2000). By definition, preclinical dementia refers to a state in the development of dementia were cognitive decline is so small that individuals still perform within normal limits on measures of cognitive ability (Small, et al., 2000). As the incidence of dementia increases drastically with age, the number of preclinical cases is also positively associated with age.

3.2.2 Alcohol use

Alcohol is the most commonly used drug in New Zealand with 85% of adults' aged 16-64 reporting alcohol use within the last year (New Zealand Ministry of Health, 2009). The relationships between alcohol use and cognitive functioning are inherently complex. It is common knowledge that during acute stages, alcohol consumption considerably impairs individuals' cognitive performance and these effects have also been observed in laboratory settings (i.e., Ridderinkhof, de Vlugt, & Bramlage, et al., 2002; Weissenborn, & Duka, 2003; Zhu, Volkow, & Ma, et al., 2004). While heavy alcohol consumption is linked to the development of dementia (i.e, Oslin, & Cary, 2003), some research indicates that low to moderate levels of alcohol use may protect against the development of dementia (e.g., Solfrezzi, Capurso, Gagliardi, Santamato, Baldassarre, & Capurso, 2007). However, dementia is generally more common among people with alcohol problems than individuals who do not exceed the recommended drinking limits, and it has been estimated that about one quarter of individuals with dementia have alcohol-related problems (Smith & Atkinson, 1995; Oslin, Atkinson, & Smith, et al., 1999). Alcohol can affect the brain in a number of different ways: 1) cell metabolism can directly be effected by toxicity, 2) alcohol can result in thiamine deficits, resulting in disrupted metabolism, 3) alcohol can result in brain damage associated with vascular damage, and 4) alcohol consumption often leads to falls and other accidents as well as damage caused by falls and other accidents (Cox, Anderson, & McCabe, 2004).

When alcohol is found to be the primary reason for brain damage and/or cognitive impairment, the terms applied to describe this alcohol-related brain damage usually splits into two main categories: Wernicke Korsakoff's Syndrome (WKS) and alcohol-related dementia. The cause of WKS is thiamine deficiency, and alcohol misuse can contribute to

this by two mechanisms. Firstly, alcohol interferes with the absorption of thiamine in brain tissue and secondly, alcohol abuse often leads to malnutrition due to poor diet (McCabe, 2011). The acute stage of WKS is usually described as Wernicke's encephalopathy which is characterised by episodes of confusion, impaired consciousness, impaired eye movement disturbance and impaired mobility (Jaques & Stevenson, 2000). Acute episodes may lead to chronic Korsakoff psychosis which manifests itself by severe memory deficits and other cognitive impairments from which recovery is unlikely (Smith & Atkinson, 1995). Excessive alcohol use may also affect the brain more generally, leading to more wide-ranging, defused, cognitive impairments. As a neurotoxin, alcohol may result in the death of cells and may also interfere with blood circulation and neurotransmitter systems (Brust, 2008; Crowe, 1999). Many terms are used to describe conditions that may have been caused by alcohol including alcoholic dementia, alcoholic brain damage, alcohol amnestic syndrome, and most commonly, alcohol-related dementia (Gupta & Warner, 2008). Alcohol-related dementia may have multiple causes and has a higher prevalence than WKS (Ritchie & Villebrun, 2008).

3.2.3. Exercise

Health-related behaviours such as exercising may also moderate memory performance. Research on the relationship between physical fitness and memory performance shows a mixed pattern of results. Because most of the research in this area is correlational, it remains unclear whether physical activity moderates cognition or whether individuals with high levels of cognitive functioning are more likely to exercise (Hultsch, Hertzog, Small, & Dixon, 1999). Kramer and colleagues (1998), indicated that long-term aerobic fitness programs may improve certain aspects of attention and memory performance. However, other studies did not find such effects (e.g., Hill, Storandt, & Malley, 1993). A more recent study by Whitbourne, Neupert, and Lachman (2008) showed that, with respect to everyday memory, physical activity levels did not moderate the occurrence of memory failures on the between person level. However, positive effects of exercise on memory performance were found on the intraindividual level. Specifically, individuals report fewer everyday memory failures on days when they engaged in exercise behaviour, and this was the case for older adults in particular.

3.2.4 Stress and memory

Stress has been shown to be a strong moderator of memory performance (e.g., Lupien & Lepage, 2001; McEwen, 2000). This association has been identified in both, laboratory and naturalistic settings. In the laboratory, it has been shown that cortisol responses are associated with poor memory performance (Wright, Kunz-Ebrecht, Iliffe, Foese, & Steptoe, 2005). In addition, an investigation by Kuhlmann, Piel, and Wolf (2005) clearly showed that exposure to a stressful experience, in the form of a public speaking task, led to poor word list recall. Although such laboratory findings are valuable to understand the basic associations, they do not explain the relationship between naturally occurring stressors and real-world memory tasks which may be particularly important for the well-being of individuals on a daily basis (Neupert, Almeida, Mroczek, & Spiro, 2006). Using a daily diary study design, Neupert and colleagues found that older adults who experience stress, and particularly interpersonal stress, report more memory difficulties than people who experience fewer stressors. In relation to cognitive development, studies by McEwen and Sapolsky (1995), and Sapolsky (1996) found that stress is a vital component in the course of age-related cognitive decline.

Taking into account that memory is not a unitary process, Luethi, Meier, and Sandi (2009) examined the differential effects of stress on specific memory systems. They found clear evidence for impaired WM capacity when exposed to stress. No performance differences were observed for verbal explicit and implicit memory if the stimuli were neutral. However, stress actually improved memory performance for negative stimuli within classical conditioning paradigms, and for spatial explicit memory. Thus, this investigation showed that stress can have both detrimental and enhancing effects on memory performance, depending on the specific system and task under investigation. Overall, both laboratory and everyday memory studies have shown the effects of stress on memory are to be more unfavourable than favourable. Stress levels are therefore important determinants of memory performance that would be an important consideration for improving memory performance.

3.2.5 Social engagement and relationships

A growing amount of research evidence indicates that the quality and quantity of social relations are important determinants of cognitive ageing. Social networks and support in the form of social ties, marital status, and the general level of support from relatives and friends are predictive of later-life mental health outcomes including cognitive impairment and well-being (Gow, Pattie, Whiteman, Whalley, & Dearry, 2007). Specifically, the contributions of social relations to the health and well-being of the elderly is particularly important for the shaping of successful ageing (Antonucci, 2001). When the effects of social relations on memory performance are considered, research clearly shows that low levels of social support have detrimental effects on memory performance. A study investigating the association between social relations and dementia showed that individuals with poor social networks (i.e., living alone, lack of close relationships) are 60% more likely to develop dementia than individuals with high social engagement (Fratiglioni, Wang, Ericsson, Maytan, & Winbland, 2000). Even in the absence of dementia, low social support levels have been shown to be associated with cognitive decline. Seeman, Lusignolo, Albert, and Berkman (2001) conducted a longitudinal study that showed that low emotional support at baseline is related to lower cognitive functioning at a 7.5-year follow-up examination.

The mechanisms behind the social support/cognitive decline relationship are not fully understood. However, a viable hypothesis is that social support may act as a buffer against stressful life events, and thus may reduce the cumulative negative effects of stress (Gow, et al., 2007). Overall, research findings suggest that a positive social environment acts as a protection against cognitive decline and thus the potential of social relations should not be underestimated in memory research and rehabilitation.

3.3 Motivational and Cognitive Moderators of Memory Performance

3.3.1 Memory goals

One aspect of psychological functioning that has received little attention with respect to memory is the degree to which individuals set and strive to attain memory goals. A goal can be defined as an internal representation of a desired state (Austin &

Vancouver, 1996). Generally, when goals are set, motivation, attention, and goal-directed behaviour increase (Bandura, 1989; Locke & Latham, 2002; Schunk, 1991). A number of studies suggest that setting memory performance goals can enhance objectively measured memory performance. Stadtlander and Coyne (1990) examined the effects of goals and performance feedback on a free-recall task. Both younger and older adults performed better in the goal/feedback condition when compared to the control condition. More recently, West, Welch, and Thorn, (2001) conducted a number of memory goal studies that showed that younger adults responded to goals with increased performance and self-efficacy scores across trials. For older adults, the effects of goals were found to be weaker but this age effect did depend on the nature of the task (i.e., task difficulty) and the type of feedback given (West & Thorn, 2001; West et al., 2001). Specifically, when baseline memory scores are used to determine experimenter-set memory goals (i.e., controlling for older adults weaker memory performance) and positive performance feedback is given consistently, memory goal setting benefits are considerable across the adult lifespan (West, Thorn, & Bagwell, 2003).

3.3.2 Emotional well-being

Meta-analytic analysis of the association between depressed mood and memory impairment has shown a stable positive relationship (Byrd Burt, et al., 1995). However, this analysis also indicated that the relationship is linked only to particular aspects of memory, and that the relationship is only found for a particular subset of depressed individuals. Specifically, moderating variables across studies did not show consistent predictive qualities, and often varied as a function of the type of memory being assessed (i.e., recall or recognition). Overall, the authors acknowledged that their analysis of moderating variables was insufficient to examine which factors are most predictive of the observed association. In terms of participant characteristics, age and patient status (in- or outpatient) have been identified to be the most consistent predictors of the depression/memory relationship. Generally, the association between depression and memory difficulties is higher in younger people than in older people. Considering patient status, results showed that inpatients' memory performance was more strongly associated with depression than it was the case for outpatients.

Paterniti, Verdier-Taillefer, Dufouil, and Alpėrovitch (2002) conducted a longitudinal investigation to examine the depression/memory relationship within a population of elderly with normal cognitive functioning. They found that higher baseline levels of depressive symptoms predicted cognitive decline at a 4-year follow-up. In addition, increasing levels of depression were also found to be negatively associated with metamemory scores (Cipolli, Neri, De Vreese, Pinelli, Rubichi, & Lalla, 1996).

3.3.3 Stereotypes about ageing and memory

The stereotype-threat framework proposes that stereotypes may have a negative influence on performance when an individual's behaviour has the potential to reinforce negative stereotypes about the group to which he or she belongs (Steele, Spencer, & Aronson, 2002). Research has shown that stereotypes about memory and ageing affect memory performance depending on individual's age. Andreoletti and Lachman (2004) found that individuals who were provided with counter-stereotypical information about age differences in memory (e.g., told that there are usually no age differences in memory performance on the test) evidenced higher levels of recall on memory test compared to participants who were presented with stereotypical information (e.g., told that there are age differences in test performance). Similarly, O'Brian and Hummert (2006) found that middle-aged participants in the low threat condition (i.e., told that performance will be compared with people over 70 years of age) performed significantly worse that participants in the high threat condition (i.e., told that performance will be compared to people younger than 25 years of age). Thus, negative memory and ageing stereotypes affect memory performance of middle-aged people and considerations of such stereotypical beliefs are warranted in memory enhancement efforts.

3.3.4 Memory self-efficacy

A popular conception about memory ageing is that organic deterioration in the brain inevitably involves uncontrollable memory decline (Poon, 1985). However, subjective memory performances may also be moderated by metacognitions. One of the most researched concepts of metacognitions is self-efficacy. Self-efficacy beliefs refer to beliefs in one's own power and control to act effectively in various domains of

functioning (Bandura, 1977). Bandura (2001) argues that self-efficacy theory is an important aspect of cognitive ageing research as older adults desire to maintain agency and remain in control over their cognitive functioning. Despite this desire to maintain control, older adults may lack the necessary sense of mastery for memory abilities for two reasons. First, it may be that they have observed changes in their own memory performance, and secondly, their culture may have taught them that memory decline is inevitable (McDougall, 2009). These factors may then contribute to a reduced sense of memory self-efficacy. Studies have shown that memory self-efficacy decreases with age (McDougall, 2001; McDougall, Montgomery, Eddy, Jackson, Nelson, Stark, et al., 2003), and that actual memory performance varies with individuals' beliefs about their cognitive abilities (Berry, 1989). For example, a study of community dwelling elders showed that self-efficacy beliefs accounted for 13% of the variance in everyday memory performance (McDougall, 2004). In light of these associations, memory self-efficacy must be recognised as a potent predictor and moderator of actual memory performance.

3.3.5 A sense of memory control and memory beliefs

Among the most salient beliefs that may influence cognition are those about one's sense of control. A sense of control refers to individuals' beliefs that they are able to affect their performance (Abeles, 1990). A sense of control has been recognised as a key marker of successful ageing (Rowe & Kahn, 1998) as both mental and physical well-being to some degree depends on it (Abeles, 1991). Recent research has shed some light on the antecedents that may change individuals' sense of control. Lachman, Rosnick, and Röcke (2009) reported that, for individuals in midlife, changes in control beliefs can be predicted by a number of biopsychosocial factors which are also associated with successful ageing. Specifically, individuals in midlife who are healthy, have a more adaptive personality profile, are socially supported, and have better cognitive functioning are less likely to report a diminishing sense of control over a nine year period.

Individuals' perceptions about their control over age-related forgetfulness may vary considerably. One widely held belief is that physiological deterioration in the brain results in memory deficits that are inevitable and uncontrollable (Poon, 1985), and that memory will decline irrespective of one's efforts to maintain its function. In contrast,

memory may also be viewed as a body of skills that can be developed and maintained over time. Memory control beliefs refer to whether or not one believes that there is something that can be done to sustain or improve memory (Lachman, 1991). It has been shown that older adults tend to believe that forgetfulness is due to irreversible age-related causes, while younger adults tend to attribute forgetfulness to memory-extrinsic factors such as tension and emotional problems, (Ponds et al., 1997), or lack of effort (Lachman, 1990). Thus, as people get older, their beliefs tend to shift from perceptions of forgetfulness as manageable and reversible to beliefs that memory deficits are inevitable, uncontrollable, and age-related.

A sense of control over memory is related to increased memory strategy use and superior memory-test performance (Lachman, Andreoletti, & Pearman, 2006; Hertzog, McGuire, & Lineweaver, 1998; Lachman, 1991). Specifically, middle-aged and older adults who had higher general and memory-specific control beliefs were more likely to use memory strategies and consistently performed better at word list recall tasks. On the contrary, a lack of beliefs in memory controllability can have adverse consequences such as increased dependency on others, anxiety, reduced effort, avoidance of cognitive challenges, and decreased motivation to use one's cognitive skills (Bandura, 1989; Lachman, 1991). Overall, control beliefs, including those for memory, are considered to be antecedents as well as consequences of age-related loss. Specifically, within the model of age-related loss (i.e., Lachman, 2000), a sense of control is viewed as moderator of motivational and affective deficits that result in ageing-related losses which in turn reduce the sense of control.

3.4 Conclusion

This chapter examined some of the most important contextual variables that may moderate memory performance. The information processing approach discussed in Chapter 2 is a fundamental paradigm for the exploration of basic memory functioning and how it related to the ageing process. However, as the current chapter showed, diminishing capacity of information processing mechanisms are clearly not the only factors responsible for the variability of memory performance on both intra- and inter-individual levels. Individual differences in the factors outlined in this chapter may account for a

considerable amount of variation in memory performance. Thus, it may be said that both, the information processing mechanisms discussed in chapter 2, and the contextual factors discussed here may have significant impact on memory performance. An examination of contextual factors seems to be especially important for midlife populations. Within this cohort, the effects of senescing are far less advanced then in older age and thus may only account for a smaller proportion of variance of everyday forgetfulness. Failing to account for contextual determinants of memory performance may result in an overestimation of the size of normal age-related memory deficits (Bäckman, Small, Wahlin, & Larsson, 1999).

As discussed in Chapter 1, the lifespan perspective of successful ageing provides a contextualistic approach to ontogenetic development that takes into account both senescing and contextual variables. A lifespan perspective provides the theoretical framework for the research of this thesis, and thus, the analysis of contextual variables is of equal importance to the effects of ageing on memory.

CHAPTER IV
SUCCESSFUL AGEING AND MEMORY IMPROVEMENT: INTERVENTIONS FOR HEALTHY ADULTS

Memory compensation efforts refer to strategies and processes which people may employ to adapt or overcome decrements or impairments in memory skills (de Frias, et al., 2003). Considering what is known about ageing-effects on memory, it is not surprising that the vast majority of the memory enhancement research and praxis focuses on elderly populations. Also expected is the fact that the literature on memory enhancement presents with a clear emphasis on pathological rather than successful ageing. Numerous clinical and commercial memory programmes have been developed to both, reduce the magnitude of forgetfulness, and to minimise concerns related to memory decline among the elderly.

Memory programmes commonly rely on a number of specific techniques (e.g., method of loci, pegword method) that are part of particular strategies (e.g., focusing on mnemonic training or cognitive restructuring). Meta-analyses (i.e., Verhaeghen, Marcoen, & Goossens, 1992; Floyd & Scogin, 1997; Metternich, Kosch, Kriston, Härter, & Hüll, 2010) have shown that memory enhancement programmes are generally effective. While these programmes were traditionally focused on the teaching of mnemonic techniques, more recent approaches to memory improvement are more comprehensive. The meta-analyses indicated that comprehensive programmes that include modules to improve individual's memory beliefs and self-efficacy or knowledge about the ageing process, are more effective than mnemonic training alone.

Specific intervention modules that account for the observed memory improvement differ for objectively and subjectively measured memory performance. Expectancy change interventions such as cognitive restructuring or psychoeducation account for most improvement in self-reported memory deficits and for objectively measured memory performance, mnemonic training has been shown to be the most effective intervention (Metternich, et al., 2010). At the present time, the literature suggests that the effects of memory intervention, while detectable for up to two years after training, have not been shown to generalise to the broader aspects of everyday memory functioning (Dixon, Rust, Feltmate, & Kwong See, 2007).

The current chapter provides an overview of each of the most commonly thought memory enhancement techniques and the evidence for their relative efficacy. This is followed

by a review of multifactorial memory programmes that have been developed for populations of normally ageing adults.

4.1 Common memory improvement and expectancy change strategies

4.1.1 Memory mnemonics

Internal strategies

Most memory enhancement programmes that have been developed to date focus on the teaching of internal mnemonic strategies. Among the most widely used mnemonics are the method of loci and the peg-word systems. Briefly, the method of loci is a technique where items to be remembered are visualised in a mental image of a familiar environment. Peg-word systems also rely on mental imagery. The idea is to visually associate to-be-learned items with those already well known. For example: one rhymes with bun, two with shoe, and three with tree and so on. When the new item to be remembered (e.g., buy newspaper) is conjured up as a visual image such as a bun wrapped in newspaper, then on arrival at the shop, one goes to the peg word one – remembers bun – and then the visual image of the bun wrapped in the newspaper.

Two meta-analytic investigations that mostly (but not exclusively) focused on internal mnemonic training provide clear evidence for the effectiveness of such strategies. Effect sizes indicated that mnemonic training enhances both subjective (d_{++} = .19) and objective (d_{++} = .66) memory performance among older adults (Floyd & Scogin, 1997; Verhaeghen, et al., 1992 respectively). Other studies however showed that mnemonic techniques are not readily applicable to everyday life and participants who are trained to use them seldom continue to apply them beyond the training setting (Scogin & Bienias, 1988). Indeed, even among academic memory researchers, who are aware of the potential benefits of mnemonic strategies, self-reported use in everyday life is surprisingly low (Park, Smith, & Cavanaugh, 1990). The lack of generalisability and long lasting effects, suggests that mnemonic strategies may not be the best approach to improve memory performance in everyday life (Herrmann, Rea, & Andrzejewski, 1988).

External strategies

In contrast to the limited generalisability of internal mnemonic techniques, external strategies are more effective and easily modifiable for a broader class of everyday memory problems (Dixon, et al., 2007). External aids may provide support in a number of different

ways: 1) they cue or prompt actions or retrieval of information, 2) they serve as an external memory store, and 3) they support knowledge acquisition (Kapur, Glisky, & Wilson, 2004). Generally, external aids can be categorised as either environmental (e.g., putting objects in a conspicuous place) or portable memory aids (e.g., using a diary) (Kapur, Glisky, & Wilson, 2002). Environmental external aids can be further divided into proximal and distal memory aids. Examples of proximal aids include wall-charts, clocks, and alarms. Examples for distal memory aids are road traffic signs, name badges, and uniforms.

Several studies have found that external strategies are more popular than mnemonic strategies across the lifespan. For instance, Intons-Peterson and Fournier (1986) reported that college students use external strategies more often than mnemonic strategies because they rate them as more dependable, easier to use, and more accurate than the latter. Similarly, Dixon, et al, (2001) examined everyday memory compensation preferences of healthy middle-aged and older individuals. Using the Memory Compensation Questionnaire (MCQ, Dixon, et al, 2001), these researchers focused on five compensation strategies (external aids, increased recall-related effort, internal mnemonic techniques, increased time investment, and human collaborative assistance), and found that the use of external aids was the most frequently reported strategy used. In terms of spontaneous use of external aids in mid-life, an age x sex interaction effect has been observed (Long, Cameron, Harju, Lutz, & Means, 1999). Specifically, women increase their use of memory aids in middle-age while men decreased usage.

Spaced retrieval

Spaced retrieval (SR; otherwise known as expanding rehearsal) is a memory enhancement technique based on distributed practice, whereby learning trials are distributed over a period of time rather than block mode learning. Landauer and Bjork (1978) were first to show that SR enhances name learning, which led to the use of this technique for rehabilitation and memory training purposes. While this technique has been shown to enhance memory performance of populations such as Alzheimer's patients (Camp, Foss, O'Hanlon, & Stevens, 1996) and individuals with traumatic brain injury (Wilson, 1989), normal populations have not been shown to benefit from increasingly expanding testing intervals. Specifically, Logan and Balota (2008), who examined the effects of different spacing schedules on retention, found that although both younger and older adults benefit from spaced rehearsal techniques, the lengths of the intervals (i.e., expanding or equal) did not influence test performance.

4.1.2 Expectancy modifications

Memory and ageing education

Many individuals erroneously believe that ageing inevitably involves global reductions in memory performance. One possible way to reduce anxiety associated with everyday memory complaints is to educate people about the difference between age-related forgetfulness and pathological memory failures (Mol, Groot, Willems, & Jolles, 2006). Floyd and Scogin's (1997) meta-analysis concluded that memory enhancement programmes that incorporate educational material promoting a more realistic understanding of age-effects on memory processes are most effective. Specifically, education may modify negative beliefs and provide participants with an increased sense of control over memory (Turner & Pinkston, 1993). Positive beliefs about one's control over memory have been shown to be associated with better objective memory performance (Cavanaugh & Poon, 1989). Troyer (2001) also found support for the beneficial effects of education on memory performance, particularly for those individuals whose memory concerns resulted from lack of knowledge about memory and ageing. Education has also been found to be the most favoured intervention strategy among individuals who consider themselves as forgetful. Commisaries, et al. (1998) found that 37% of forgetful people would favour education, 29% memory training, and 12% medication as their intervention of choice.

Peer-group discussions

Gerontologists have long recognised the benefits of group discussions with same-age peers (e.g., Chene, 1994; Clough, 1992). The sharing of personal experience makes learning more meaningful and thus is conducive to the processes of learning (West, Welch, & Yassuda, 2000). According to Mills, Davidson, and Cottell (1994), comprehension is enhanced by sharing ideas and responding to others, and cooperative learning leads to higher levels of motivation and achievements. West et al. (2000) state that group discussions may enhance effectiveness of strategies because a particular strategy is "advertised" by same-age peers, who report successful application of the technique.

Comprehensive memory training programmes that facilitate group discussions have been shown to obtain higher training gains than programmes without them (Verhaeghen et al., 1992). Specifically, Flynn and Storandt (1990) indicated that group discussions for healthy adults (aged 60-80), that focus on typical problems of old age, related coping mechanisms, and a debate about the content of a self-instructional manual led to

improvement of word list recall. Moreover, a study by Caprio-Prevette and Fry (1996), where discussions about ageing and memory were part of the intervention was found to be highly effective in terms of increasing memory performance and beliefs.

Memory goals and performance feedback

Theories that examine self-regulation of performance treat goals as one of the core constructs of interest (West, Bagwell, & Dark-Freudman, 2005). Laboratory research has shown that one possible way to enhance memory is to set specific memory goals. Generally, when goals are set, motivation, attention, and goal-directed behaviour increase (Bandura, 1989; Locke & Latham, 2002; Schunk, 1991). Although goal-setting theory has received much scientific attention in various domains (e.g., school performance [Schunk, 1984, 1991], business [Locke & Latham, 1990], athletics [Bandura, 1997]), research in the domain of memory is limited.

A number of studies indicate that setting memory goals and striving to attain them improves memory performance and memory self-efficacy in the laboratory. Stadtlander and Coyne (1990) examined the effects of self-set goals and performance feedback on free-recall memory performance. Results showed that both younger and older adults performed better in the goal/feedback condition when compared to the standard recall control condition. More recently West and Thorn (2001) examined the effects of self-set goals and feedback on memory self-efficacy and performance for younger and older adults. As predicted, the motivational effects of goals and feedback were found to be lower for older adults when compared to younger adults. Specifically, goal setting increased self-efficacy for younger adults but not older adults. Although in this investigation goal setting did not result in memory performance gains, the authors argue that this may have been due to the extreme difficulty of the recall task. Other studies have shown that goal setting results in increased performance, motivation, and self-efficacy, as well as more positive memory beliefs (West, Welch & Thorn, 2001; West, Thorn, & Bagwell, 2003; West, Bagwell, & Dark-Freudeman, 2005) for both younger and older adults including middle-aged individuals. While the performance gains resulting for goal setting in the domain of memory are generally weaker for older individuals, West et al. (2005), indicate that positive performance feedback may increase the benefits of goal setting for older individuals. While goal setting for memory has not been examined extensively, the above studies suggest that setting goals is a viable strategy that may be used to enhance memory performance levels. At the present time, however, memory goal research is exclusively conducted in the laboratory with strict control

over the types of memory tasks to be completed as well as types of goals that participants may be assigned to or choose.

4.2 Multifactorial memory training for healthy populations

4.2.1 Review of comprehensive memory improvement programmes

Over the last 30 years, a number of multifactorial intervention models have been developed. Essentially, the rationale behind multifactorial approaches to memory enhancement is that they may result in performance gains that are stronger, longer lasting, and more generalisable to other tasks and situations than traditional single skill or strategy training (Stigdotter Neely, 2000). These models vary greatly in terms of their theoretical assumptions about factors that lead to memory difficulties and also with respect to the programme content, and length. Three of these models, which have been evaluated in terms of their efficacy, will be briefly reviewed here, including 1) the Concentration and Mnemonic Training Model, 2) The Cognitive Restructuring Model, and 3) The Cognitive Behavioural Model of Everyday Memory.

The Concentration and Mnemonic Training Model

The Concentration and Mnemonic Training Model (CMT) model is the earliest form of memory enhancement programme that has been evaluated and was found to be efficacious with community-dwelling elderly and college students (Yesavage, 1983, 1984; Yesavage, Rose, & Spiegel, 1982; Yesavage, 1984). The CMT model is usually offered in a total of 3 to 5 sessions emphasising the training of mnemonic strategies, concentration training, sensory awareness training, and relaxation training.

The Cognitive Restructuring Model

The Cognitive Restructuring Model (CRM) model generally focuses on participants levels of control, emphasising that one has a choice between believing to have control over one's memory capacity or believing that memory inevitably declines with age. The CRM model is offered in two 1.5 hour sessions promoting an adaptive view of memory ageing and emphasises education and strategy training. The CRM has been evaluated with groups of community elderly and the data indicated that the CRM has benefits for this population (Lachman, Steinberg, & Trotter, 1987; Lachman, Weaver, Bandure, Elliott, & Lewkowic, 1992).

The Cognitive Behavioural Model of Everyday Memory

The Cognitive Behavioural Model of Everyday Memory (CBMEM; McDougall, 2009), is one of the first models that specifically focused on everyday aspects of memory performance. The CBMEM is more time consuming that the other models described here and it is usually offered in eight 1.5 hour sessions. The emphasis is on memory and ageing education, strategy training, stress reduction, and expectancy changes in terms of participant's memory beliefs and self-efficacy. The CBMEM has been evaluated with a number of elderly groups including community-dwelling and assisted living elderly, and nursing home and retirement village residents (McDougall, 1999; McDougall, Becker, & Arheart, 2006; McDougall, 2002) and programme evaluations have attested to the efficacy of this approach.

4.2.2 Programme Content and Treatment Length

The above programmes vary considerably in terms of their content and treatment length. The characteristics of any psychological intervention are of great importance to its success. Unfortunately, treatment characteristics are often under-investigated components of treatment research within the discipline of psychology (Becker, McDougall Jr., Douglas, & Arheart, 2008). The following section examines a number of issues that may impact on treatment efficacy and effectiveness. Specifically, memory enhancement programmes may differ in the degree of participants' perceived face validity, a factor that may impact on treatment generalisability and skill maintenance. Secondly, treatment lengths vary greatly between programmes and may affect participants' motivation to participate, as well as the treatments cost-effectiveness.

Programme content and perceived face validity

One important aspect of programme content relates to the fact that participants may not like to expend large amounts of cognitive effort, especially if they do not see how the training may be of use in their everyday life (Camp, 1998). Arguably, this lack of perceived face validity may ultimately be the most important factor in intervention programmes where training effects are not maintained or generalised. For example it is doubtful whether anybody would go through the trouble of applying a mnemonic technique such as pegwords to remember a shopping list rather than quickly writing it down on a piece of paper. Similarly, relaxation techniques may be of little use for professionals who have little spare time in their daily life.

The issues of effort expenditure and ecological validity of training programmes can be regarded as one of the great challenges for programme developers and this challenge has to be met to make the transition from efficacious treatment to effective treatment (Camp, 1998). Despite this, surprisingly little attention has been given to participant evaluation of memory programmes. In order to examine the underlying factors that influence treatment effectiveness, future research should account for participants' perceptions about the usefulness of treatment content.

Treatment length and treatment effectiveness

In terms of participants perceptions of the adequacy of treatment lengths, Verhaeghen, Van Ranst, and Marcoen (1993) found that participants who evaluated memory training programmes generally rated them as somewhat too short. Specifically, the number of sessions of the seven training programmes assessed varied between four and eleven, with a median of nine. Of the 129 participants who took part in this investigation 56% indicated that there were too few sessions and 83% indicated that they wished to participate in a follow-up training programme if it was offered. The problem is that shorter interventions are likely to be more cost-effective. Recent research however showed that shorter intervention can be as effective as longer ones. Becker, et al. (2008), compared four-session to eight-session memory enhancement programmes (based on the CBMEM for older adults [65+]). These authors found that shortening the intervention by 50% had little effect on either subjective or objectively measured memory performance increase that was observed in both the long and shot intervention.

4.3 Conclusion

In terms of specific contents of memory programmes, a number of factors have been shown to increase programme efficacy. Floyd and Scogin's (1997) meta-analysis showed that memory programmes that incorporate educational material about the age-effects on memory processes are more effective. Similarly, memory programmes that incorporate group discussions enhance effectiveness of strategies because particular strategies are "advertised" by same-age peers, who report successful application of the technique (West et al., 2000). In addition, maintenance and generalisation of treatment gains of memory programme depend on the levels of face validity that the programme has for participants.

As has been argued in chapter 1, if the roots of ageing could be identified in midlife, some of the ageing-related changes in psychological functioning that occur in later life may

be delayed, minimised, or even prevented (Lachman, 2004). Similarly, Martin and Zimprich's (2005) argument that the high levels cognitive ability in midlife are likely to increase training gains also stresses the importance of midlife memory enhancement. It is thus conceivable that memory training for the middle-aged may lead to viable preventative and prophylactic treatments that may prevent more serious cognitive difficulties during later life stages. Nonetheless, the current literature on memory intervention programmes has not considered midlife populations and this research gap has led to the rationale for the research presented in this thesis. The next chapter outlines the rationale of this thesis in more detail and specifies the hypotheses tested.

CHAPTER V
RATIONALE AND HYPOTHESES OF THIS THESIS

5.1 Introduction

It had been suggested in chapter 1 that acquired pragmatic knowledge in specific domains may provide individuals with a domain-bound ability to withstand the consequences of age-related losses in fluid cognitive mechanics. This human potential to attenuate negative ageing-effects is of paramount importance to the process of *successful* cognitive ageing and is in line with the assumptions of the theory of Selective Optimisation with Compensation which specifies behavioural strategies that may regulate these processes. The notion that the acquisition of pragmatic knowledge may lower the losses in fluid cognitive mechanics discussed in chapter 1 is fundamental to the assumptions of most cognitive training efforts, including the research conducted in this thesis. Specifically, it is assumed that the effects of training (i.e., culture-based knowledge acquisition) compensate for age-related losses such as neuronal degeneration (i.e., cognitive mechanics). The generally observed efficacy of cognitive training for elderly populations with ageing-related cognitive deficits suggests that this assumption is warranted.

Chapters 2 and 3 of this thesis treated the information processing and the contextualistic approaches to memory ageing respectively. The information processing approach accounts for much of the research findings that specify how memory declines with advancing age. Similarly, contextual factors such as mood, stress, and education have also been shown to account for much of the variation in memory performance among adult populations. Overall, it can be concluded that both, information processing mechanisms *and* contextual determinants are powerful predictors of memory performance.

Research has indicated that many adults have concerns about declining memory and show interest in learning about memory strategies to enhance everyday memory functioning. Chapter 4 focused on the utility of memory enhancement for healthy older populations and cited current research literature showing that memory enhancement programmes work well for elderly populations. This is true for those elderly with moderate to severe memory impairment, as well as those who age without the constraints of ageing-related pathology.

The research literature suggests that the multifactorial memory programmes have thus far only been used with people over the age of 65 years or college students for evaluation purposes. This is in line with the general shortage of research that considers midlife when

compared to other developmental periods. It was discussed in chapter 2 that midlife is seldom an organised theme or keyword in either the memory or the ageing literature (Dixon, De Frias, & Maitland; 2001) and that research in the area of memory usually compares performances of the elderly with young adults, assuming that midlife performance lies somewhere in-between these two age groups.

Specific research that aims to reduce forgetfulness among the successfully ageing, middle-aged population is thus required. The overall goal of the research to be presented here was to develop, apply, and evaluate a memory programme for healthy middle-aged individuals. The first part involved a survey that examined the theory of Selective Optimisation with Compensation in the context of subjective memory performance. The second part, which is partly based on the findings from the survey, describes the development, application, and evaluation of the Midlife Memory Programme.

5.2 The Survey

The a preliminary survey aimed at answering a number or questions in relation to both theoretical as well as practical aspects of everyday memory performance. Although the memory programme presented in chapter 8 was specifically designed for middle-aged individuals, the survey was open to adult participants of all ages as this allowed for an examination of age-trajectories with respect to the variables of interest.

The survey was conducted as a preliminary investigation in preparation for the group intervention programme. The theory of Selective Optimisation with Compensation (SOC) has thus far not been evaluated within the context of ageing-related memory decline and the research studies presented in chapter 6 and 7 addressed a range of questions that pertain to SOC in the context of everyday cognitive failures.

As SOC postulates that individuals who select, optimize, and compensate are more likely to age successfully it follows that SOC endorsement may reduce everyday forgetfulness which evidently is an undesirable ageing-related change. The relationships examined within the context of the survey focused on SOC endorsement in the context of everyday cognitive failures which includes individuals self-reports of forgetfulness. Further variables of interest were individuals efforts to compensate for increasing forgetfulness, the degree to which individuals belief in the controllability of their memory, and a number of potential covariates of these variables of interest including age, gender, mood, subjective health status, and education.

For the purposes of the survey, six hypotheses were tested and the findings are presented in two research papers (i.e., Chapters 6 and 7):

H1: Given that SOC competencies are generally found to be associated with positive developmental outcomes, it was hypothesised that participants who report higher levels of SOC endorsement would report significantly fewer cognitive failures in the domains of forgetfulness, distractibility, and false triggering.

H2: Weiland, Dammermann, and Stoppe (2011) suggested that the ability to select, optimize, and compensate is mood-state-dependent as SOC scores varied with the seventy of symptoms of depression among a sample with depressive disorders. Given these findings, it was hypothesised that the beneficial effects of SOC on cognitive failures are moderated (diminished) by low mood among this general population sample.

H3: SOC competencies have been shown to moderate variables that may lead to positive developmental outcomes. It was hypothesised that SOC endorsement will moderate the relationship between memory compensation efforts and everyday forgetfulness. Specifically, compensation efforts would be more effective (i.e., resulting in fewer instances of forgetfulness) for those individuals who report higher levels SOC endorsement.

H4: Stronger beliefs in memory ability and controllability would account for lower rates of self-reported everyday forgetfulness.

H5: Higher levels of endorsement of the life management strategies of selection, optimization, and compensation would account for lower levels of self-reported forgetfulness.

H6: Selection, optimization, and compensation strategies would mediate the relationship between memory control beliefs and levels of self-reported forgetfulness.

5.3 The Midlife Memory Programme

Memory interventions are usually designed for conditions such as Mild Cognitive Impairment (MCI), or more severe forms of cognitive disorders such as Alzheimer's disease. Reviews of studies designed for people with MCI (Stott & Spector, 2010) and dementias such as Alzheimer's disease (De Vreese, Neri, Fioravanti, Belloi, & Zanetti, 2001) generally indicate that memory improvement efforts enhance performance for individuals with such condition.

Memory interventions have also been shown to be an efficacious treatment for elderly *without* clinically significant impairment. Three meta-analyses indicate that, for normally ageing older people, interventions can improve both objective and subjective performance levels (Verhaeghen, Marcoen, & Goossens, 1992; Floyd, & Scogin, 1997; Metternich, Kosch, Kriston, Härter, & Hüll, 2010). The specific intervention components that bring about improvement differ for self-reports of memory and objectively measured memory. For subjective memory, expectancy change interventions such as cognitive restructuring or psychoeducation account for most improvement while mnemonic training is a more effective intervention for objective memory improvement (Metternich, et al., 2010).

Overall, both, basic memory research, as well as factorial intervention models, crucially contributed to memory improvement efforts for elderly with or without significant memory impairment. However, despite noticeable objective and subjective memory decline during midlife, middle-aged individuals have largely been excluded from memory intervention research and practice. For a number of reasons, midlife would constitute an ideal time for memory interventions to take place. One argument for midlife interventions relates to the notion that an establishment of a cognitive reserve in midlife may delay or even compensate for cognitive decline in old age (Willis et al., 2010).

Objective as well as subjective memory begins to decline notably during midlife (Schaie, 1996; Commisaries, et al., 1998) rather than in old age and those in midlife have expressed concerns about their memory (Commissaries, et al., 1998). Despite the observation that forgetfulness increases in midlife, other cognitive performances are generally at a lifetime peak for most individuals during this period (Eichorn, Clausen, Haan, Honzik, & Mussen, 1981; Hultsch, et al., 1999; Schaie, 1996). It has been suggested that midlife would therefore be an ideal time for memory interventions to take place as higher levels of general cognitive ability would increase the likelihood of training gains (Martin & Zimprich, 2005). There may also be biological advantages to memory improvement in midlife. A recent study suggests that improvements in episodic memory during midlife are associated with significantly larger hippocampal volume in old age compared to those individuals whose midlife episodic memory remained stable or declined (Borghesani, et al., 2010). These authors suggested that midlife memory improvement may optimise hippocampal ageing and suggest that interventions that promote brain health should start during midlife rather than old age. Thus, while the opportunity to take advantage of midlife strengths, to maximise training gains, and possibly increasing cognitive reserves for later life, has been identified, it is surprising that memory intervention research usually excludes the midlife cohort.

The overall goal of the research presented here was to develop, implement, and evaluate a memory programme that was specifically designed for the normally ageing midlife cohort. Chapter 8 describes the Midlife Memory Programme an intervention that aimed to improve objective and subjective memory performance.

For the purposes of the evaluation of the Midlife Memory Programme five hypotheses were tested that are findings are presented in a research paper (Chapter 8):

H1: Compared to pre-programme assessment scores, objective memory performance scores would be higher at post-treatment assessment.

H2: Compared to pre-programme assessment scores, subjective memory performance scores would be higher at post-treatment assessment.

H3: Compared to pre-programme assessment scores, memory control belief scores would be higher at post-treatment assessment.

H4: Compared to pre-programme assessment scores, everyday memory strategy usage would be higher at post-treatment assessment.

H5: The predicted performance gains (i.e., H1, H2, H3, and H4) would be maintained over a three months period.

The following three chapters (e.g., 6, 7, and 8) represent the three original articles that comprise the research of this thesis. Chapter 9 will summarise the overall research findings and discusses the core findings as well as the implication and limitations of this research.

CHAPTER VI

EVERYDAY COGNITIVE FAILURES AND MEMORY COMPENSATION EFFORTS: A SELECTIVE OPTIMIZATION WITH COMPENSATION (SOC) ANALYSIS

Note:

The research in this Chapter is presented in manuscript from and has been submitted for peer-review and possible publication in Psychology and Ageing. The appendices referred to in this chapter are included for examination purposes only and are not part of the manuscript that was submitted to Psychology and Ageing.

6.1 Abstract

The theory of Selective Optimization with Compensation (SOC) outlines how individuals may adapt more or less successfully to ageing-related changes. Controlling for age, gender, education, and subjective health, the present study examined the relationships between cognitive failures and the SOC life management strategies among a sample of adult New Zealanders. Results of this online survey ($N = 409$) indicated that SOC endorsement accounted for a significant reduction in each of the facets of the Cognitive Failures Questionnaire (i.e., forgetfulness, distractibility, and false triggering). Additional hypotheses tested whether mood may have a moderating effect on the beneficial effects of SOC, and whether SOC endorsement may moderate individual's efforts to compensate for perceived memory impairments. Results suggest that low mood attenuates the beneficial effects that SOC has on the frequency of cognitive failures. Counter to expectations, SOC endorsement did not affect the forgetfulness/memory compensation relationship. Results are discussed in view of methodological limitations and suggestions for future research are outlined.
KEYWORDS: Cognitive Failures, Memory Compensation, SOC, Mood

6.2 Introduction

On a global scale, the population of individuals above the age of 60 increased from just above 200 million in the 1950s to 606 million at the outset of the 21st century (United Nations [UN], 2002). The UN estimates that this age-category will reach the 2 billion mark by 2050. Life expectancy at birth in New Zealand increased from 54 to 75 years of age for females, and 50 to 69 years of age for males between 1876 and 2004 (Statistics New Zealand [SNZ], 2009). Twelve percent of the New Zealand population are above the age of 65 and the government estimated that this age-group will include one million people, a fifth of New Zealand's total population, within the next 25 years (SNZ, 2009). In view of the population ageing process, knowledge about the psychology of the ageing becomes increasingly important.

It is common knowledge that cognitive abilities decline with advancing age and the research literature has established a strong link between ageing and a decline in cognitive functioning (Colsher & Wallace, 1999; Evans et al., 1993; Schaie, 1996; Wilson, Becket, Bennet, Albert, & Evans, 1999). Cognitive failures have been defined as a failure to complete a cognitive task that a person should normally be capable of completing (Wallace, Kass, & Stanny, 2002; e.g., people often forget recently introduced names, or wonder where they have put their keys or whether they have locked the door after leaving their house). By definition, cognitive failures occur even though the individual possesses the ability to complete the task, implying that something interferes with task completion.

The Cognitive Failure Questionnaire (CFQ; Broadbent, Cooper, FitzGerald, & Parkes, 1982) was designed to assess individual's proneness to committing everyday cognitive failures and based on factor analysis, Broadbent and colleagues identified a single cognitive failure proneness factor that interferes with everyday task completion. The nature of the CFQ factor structure has been subject to much debate over the last 20 years. A number of factor analytic studies have examined the dimensionality of the questionnaire and many authors have not agreed with the single factor solution proposed by Broadband et al. (1982) and two, three, four, and five factors solutions have been proposed (e.g., Larson, Alderton, Neideffer, & Underhill, 1997; Pollina, Greene, Tunick, & Pucket, 1992; Wagle, Berrios, & Ho, 1999; Wallace, Kass, & Stanny, 2002; Wallace 2004; Rast, Zimprich, Van Boxtel, & Jolles, 2009). Comparison of the different factor structures are described elsewhere (Wallace 2004; Rast, et al., 2009), and given the superior psychometric properties, the current study examined Rast's, et al. (2009) three factor model of the CFQ. The three factors are: 1) Forgetfulness (i.e., tending to forget something known or planned [e.g., intentions, names, appointments]); 2)

Distractibility (i.e., being absentminded or a proneness to loosing focused attention [e.g., daydreaming]); and 3) False Triggering (i.e., being prone to interrupted information processing in sequences of cognitive and/or motor actions [e.g., not knowing why one has entered a different part of a house]).

Cognitive (memory) failures and memory compensation efforts

Forgetfulness is by far the most commonly experienced cognitive failure measured by the CFQ (i.e., Rast, et al., 2009) and memory lapses are the primary example of cognitive failures that may occur across the adult lifespan. The Maastricht Ageing Study indicated that 40% of adults (aged 25 to 85) and 29% of young individuals considered themselves to be forgetful (Ponds, Commissaris, & Jolles, 1997). Increasing age is associated with an increasing number of cognitive failures, especially those involving memory (Rast, et al., 2009) and declining memory has been identified as a key concern for many older individuals (Glisky & Glisky, 1999) and even young people report to worry about their forgetfulness (Commissaris, Ponds, & Jolles, 1998). Findings from studies that examine the relationship between objectively measured memory impairment and self-reported forgetfulness are mixed. Some cross-sectional studies suggest that memory complaints are indicative of actual impairment (e.g., Jonker, Geerlings, & Schmand, 2000), while others show little or no association between objective and subjective impairment (e.g., Jonker, Launer, Hooijer, & Lindeboom, 1996; Riedel-Heller, Matschinger, Schork, & Angermeyer, 1999). A similar pattern is found in longitudinal data with some studies showing associations between subjective and objective memory performance (e.g., Dufouil, et al., 2005, Martin & Zimprich, 2003) and others show no association (e.g., Frerichs & Tuokko, 2006; Jorm, Christensen, Korten, Henderson, Jacomb, & Mackinnon, 1997). Thus, the nature of the relationship between objective and subjective memory impairments is complex and more research is needed to clarify mixed findings.

One factor that has most consistently been identified as a strong predictor of subjective memory impairments is emotional well being. In fact, depressed mood is a stronger predictor of self-reported forgetfulness than actual (objectively measured) memory impairment (Smith, Perterson, Malec, & Tangalos, 1996; Bolla, Lindgren, Bonaccorsy, & Bleeker, 1991). Subjective memory impairments can have other negative consequences for everyday functioning and well-being, as higher levels of forgetfulness are associated with reduced life satisfaction and lower levels of well-being (Mordechovich, Merims, & Giladi, 2010; Mol, van Boxtel, Willems, Verhey, & Jolles, 2009). Subjective memory decline may

also be related to mild cognitive impairment and even indicate an early stage of Alzheimer's disease (Treves, Verchovsky, Klimovitzky, & Korczyn, 2005; Glodzik-Sobanska, Reisberg, De Santi, Babb, Pirraglia, & Rich, et al., 2007; Jessen, et al., 2007).

Given the high prevalence of subjective memory impairments and its adverse effects, it is not surprising that adults use memory compensation strategies to overcome impairment in everyday memory skills (de Frias, Dixon, & Bäckman, 2003). A number of variables have been identified that may influence the degree to which individuals apply memory compensation strategies. Older adults are more likely to use memory strategies than younger adults (Bolla, Lindgren, Bonaccorsy, & Bleecker, 1991; Hertzog, Hultsch, & Dixon, 1989; Hultsch, Hertzog, & Dixon, 1987; Loewen, Shaw, & Craik, 1990; Ponds & Jolles, 1996). Individuals who report higher levels of forgetfulness are more likely to engage in compensation efforts (Garret, Grady, & Hasher, 2010). While this may seem paradoxical at first, by definition compensation efforts must originate in a state of deficiency, and when a perception of memory deficiency exist, application of compensatory behaviour becomes more relevant and thus prevalent (Bäckman & Dixon, 1992). Poor objective health status is associated with a reduction in memory strategy use, while subjective health-ratings have no association with compensation efforts (de Frias, et al., 2003). Individuals with greater cognitive reserve (i.e., higher education and verbal IQ), and those with certain personality characteristics (i.e., high agreeableness and high neuroticism) are also more likely to apply memory compensation strategies (Garret, et al., 2010; de Frias, et al., 2003).

Research generally suggests that memory compensation efforts are effective. Two meta-analytic investigations that largely (but not exclusively) focused on mnemonic training provide clear evidence for the effectiveness of memory strategies. Effect sizes indicated that mnemonic training enhances both subjective (d_{++} = .19) and objective (d_{++} = .66) memory performance (Floyd & Scogin, 1997; Verhaeghen, Marcoen, & Goossens, 1992 respectively).

Selective optimization with compensation

The meta-theoretical framework of Selective Optimization with Compensation (SOC; Baltes & Baltes, 1990) views the relative minimization and prevention of undesired developmental outcomes and the maximization and attainment of developmental goals as the basic premises of the successful ageing process. The theory posits that individuals may employ the strategies of selection, optimization, and compensation to adapt successfully to the developmental changes that may occur with age. From a SOC perspective, the process of selection involves choosing idiosyncratic goals that individuals commit to in varying degrees.

People may differ in goal commitment with respect to their memory as they age. A person may regard increasing forgetfulness as a normal and acceptable developmental change and efforts to compensate for declining memory are not selected as a personal priority. Another person may worry considerably about increasing forgetfulness and memory maintenance or improvement is selected as a goal. Two subtypes of selection are postulated: elective selection (i.e., focusing on aiming at desired states [i.e., to improve memory for names]) and loss-based selection (i.e., adjusting one's goals in response to loss in goal-relevant means [i.e., forgetting names at my age is acceptable]). Optimization defines the use of means to achieve selected goals (e.g., using visualization techniques to compensate for declining verbal memory skills). Compensation defines the process of employing means that are required to maintain memory functioning when one is confronted with a loss in goal-relevant means (e.g., using a memory diary to compensate for memory impairment when visualization becomes increasingly difficult).

Research suggests that individuals, who select goals and strive to attain (optimization) and maintain (compensation) them are more likely to experience positive developmental outcomes. The SOC competencies of selection, optimization, and compensation are related to a range of indicants of personal well-being such as positive emotions, autonomy, environmental mastery, personal growth, positive relations, purpose in life, and self-acceptance (Freund & Baltes; 2002). Wiese, Freund, and Baltes (2000) examined the SOC competencies in relation to general well-being, and career- and partnership-related successfulness and those who endorsed SOC competencies fared better in all three domains. Gestsdottir and Lerner (2007) reported positive associations between SOC and positive youth development and inverse associations with negative youth development. Thus, previous research has generally shown that SOC competencies are associated with successful developmental outcomes. Weiland, Dammermann, and Stoppe (2011) showed that an individual's ability to benefit from the SOC competencies may be dependent on their mood. These authors examined SOC endorsement among a sample of clinically depressed individuals and found SOC scores to be significantly lower during the active phase of depression when compared to either a control group or during remission of depressive episodes. A negative association between depression and SOC have also been observed among a sample of older Chinese people (Chou & Chi, 2001).

The current study focuses on the occurrence of cognitive failures in the context of the theory of Selective Optimization with Compensation. Specific attention is given to the moderating effects that mood may have on the benefits of SOC and on the effects that SOC

may have on individual's memory compensation efforts. A number of hypotheses were tested:

H1: Given that SOC competencies are generally found to be associated with positive developmental outcomes, it is hypothesised that participants who report higher levels of SOC endorsement will report significantly fewer cognitive failures in the domains of forgetfulness, distractibility, and false triggering.

H2: Weiland's, et al. (2011) study suggested that the ability to select, optimize, and compensate is mood-state-dependent as SOC scores varied with the seventy of symptoms of depression among a sample with depressive disorders. Given these findings, it is hypothesised that the beneficial effects of SOC on cognitive failures are moderated (diminished) by low mood among this general population sample.

H3: SOC competencies have been shown to moderate variables that may lead to positive developmental outcomes. It is hypothesised that SOC endorsement will moderate the relationship between memory compensation efforts and everyday forgetfulness. Specifically, compensation efforts will be more effective (i.e., resulting in fewer instances of forgetfulness) for those individuals who report higher levels SOC endorsement.

6.3 Method

Participants

The sample included 409 members of the general population of New Zealand (241 females and 168 males). Their mean age was 48.10 years of age (*SD* = 12.94, range = 18-85). The majority of the sample where middle-aged ([18-24yrs: *n* = 26]; [25-31 yrs: *n* = 25]; [32-38 yrs: *n* = 30]; [39-45 yrs: *n* = 78]; [46-52 yrs: *n* = 86]; [53-59 yrs: *n* = 80]; [60-66 yrs: *n* = 62; 67-74 yrs: *n* = 18]; [75-81 yrs: *n* = 4]). Of these participants, 291 identified themselves as employed, 25 as unemployed, 44 as retired, and 45 as students (4 people did not answer the question).

Measures

A questionnaire was used to assess participants age, gender, self-rated mood over the last six months (i.e., 1 = *poor/bad;* 2 = *fair;* 3 = *good;* 4 = *excellent* [reflecting reverse scored order from the survey]), self-ratings of current health status (i.e., 1 = *excellent;* 2 = *good;* 3 =

fair; 4 = *poor/bad*), and level of education (1 = *primary school*; 2 = *secondary school*; 3 = *undergraduate university course*; 4 = *postgraduate university course*).

Selection, Optimization, and Compensation Questionnaire (SOC; Freund, & Baltes, 2002). The 12-item, domain general, short-form of the SOC questionnaire was used to examine the two aspects of selection (elective [ES] and loss-based [LBS]), optimization, and compensation. The measure has equivalent psychometric properties to the 48-item version (Freund, & Baltes, 2002). Each of the 12 items consisted of two statements, characterising fictitious individuals who either adhere (Person A) or do not adhere (Person B) to SOC-related life management strategies. For example:

Elective Selection. Person A: "I concentrate all my energy on a few things" or Person B: "I divide my energy among many things".

Loss-Based Selection. Person A: "When things don't go as well as before, I choose one or two important goals" or Person B: "When things don't go as well as before, I still try to keep all my goals".

Optimization. Person A: "I keep working on what I have planned until I succeed" or Person B: "When I do not succeed right away at what I want to do, I don't try other possibilities for long".

Compensation. Person A: "When something in my life isn't working as well as it used to, I ask others for advice or help" or Person B: "When something in my life isn't working as well as it used to, I decide what to do about it myself, without involving other people".

Participants were asked to choose which of the two individuals is most similar to them and after selecting the item that best describes their behavior, they were asked to rate the degree of similarity between their behavior and the behavior they selected on a 4-point scale ranging from 1 (*a little*) to 4 (*exactly*). Thus, scores on each item can range from a 0 (non-SOC strategy selected) to 4 (SOC strategy selected and an exact degree of similarity indicated), and total scale scores can range from 0 to 48, with higher scores denoting higher levels of SOC endorsement. The SOC questionnaire has adequate construct validity (Freund, & Baltes, 2002) and a number of studies have provided evidence that selection, optimization, and compensation are related to various subjective indicators of successful development (e.g., Gestsdottir & Lerner, 2007; Freund, & Baltes, 2002; Wiese, et al., 2000).

Cognitive Failures Questionnaire (CFQ; Broadbent, et al., 1982). The CFQ is a 25-item self-report inventory that inquires about the prevalence of everyday cognitive failures. Factor analytic studies (i.e., Rast, et al., 2009; Wallace, Kass, & Stanny, 2002) have suggested a three factor solution for the CFQ, measuring cognitive failures in the domains of forgetfulness, distractibility, and false triggering. A 4-point Likert-type scale (i.e., *never, sometimes, often, always*) served as response format. Scores for the CFQ can range from 0 to 100, and higher scores denote higher levels of everyday cognitive failures. The CFQ has been shown to be a valid and reliable measure in a cohort of healthy older New Zealanders (Knight, McMahon, Green, & Sheaff, 2004).

Memory Compensation Questionnaire (MCQ; Dixon, et al., 2001). The 34-item MCQ assesses individual's usage of everyday memory strategies and includes five sub-scales: External (i.e., usage of notes and calendars); Internal (i.e., mnemonic strategies); Time (i.e., investing more time to succeed in memory tasks); Effort (i.e., increasing levels of concentration), and Reliance (i.e., relying on other people to remind oneself). A four-point Likert-type response format (*never, sometimes, often, always*) was used for the MCQ. Total scale scores ranges from 0 to 136. Previous research with the MCQ suggests acceptable levels of internal reliability (Dixon, et al. 2001), and construct validity (de Frias & Dixon, 2005).

Procedure

Several procedures were used to recruit participants. The survey was advertised online with a Facebook advertisement[1] that appeared on personal Facebook interfaces. When individuals clicked on the advertisement, they were directed to the information sheet and survey[2]. Secondly, an advertisement[3] (containing brief descriptions of the survey and the details needed to access the webpage was placed into two local newspapers). An e-mail message was also sent to a graduate student list associated with the researchers' institution. This message contained a brief overview of the survey and the link to the webpage. Recipients of this email message were asked to forward the message to friends and acquaintances.

[1] Appendix A.0
[2] Appendix A.2
[3] Appendix A.1

6.4 Results

In the interest of model parsimony, overall MCQ scores and overall SOC scores were computed. The individual scales of the MCQ were significantly intercorrelated: *r*s ranged from .16 (external aids and reliance on others) to .70 (internal aids and effort expenditure) and an MCQ Strategy composite index was created using principle components analysis (PCA). Bartlett's test of sphiricity was statistically significant ($p < .001$) and the Kaiser-Meyer-Olkin measure of sampling adequacy was .77, suggesting that PCA was appropriate for use with these data. A one component solution was obtained (eigenvalue = 2.71, accounting for 54 % of the variance) and component scores were computed.

The individual subscales of SOC were also significantly intercorrelated with *r*s ranging from .20 (elective selection and compensation) to .52 (optimization and compensation) and averaged SOC component scores were used to calculate an overall SOC score. Alpha coefficients, means, standard deviations, and correlation coefficients for all measures are presented in Table 1.

Table 6.1: Means, standard deviations, alpha coefficients and intercorrelations of all measures

Psychometric Scales	*M*	*SD*	α	1	2	3	4	5	6	7	8	10
1 CFQ-Forgetfulness	25.24	4.61	.84	-								
2 CFQ-Distractibility	27.01	5.48	.84	.88**	-							
3 CFQ-False Triggering	26.34	5.09	.83	.92**	.86**	-						
4 CFQ-Overall	48.68	9.12	.90	.94**	.97**	.95**	-					
5 MCQ-Strategy	78.06	13.67	.90	.36**	.29**	.35**	.33**	-				
6 SOC	22.66	10.90	.71	-.19**	-.15**	-.15**	-.17**	.11*	-			
7 Mood-ratings	2.12	0.75	-	-.26**	-.31**	-.26**	-.30**	-.08	.11*	-		
Control Variables												
8 Age	48.10	12.94	-	-.20**	-.28**	-.20**	-.24**	-.08	-.11*	-.15**	-	
10 Education	3.14	0.84	-	-.06	-.07	-.04	-.06	.09	.14**	-14**	-.08	-
11 Health Status	2.02	0.73	-	.21**	.24**	.23**	.24**	.07	-.11*	-.38**	-.09	-.10

Note: $N = 409$. * = $p < .05$. ** = $p < .01$. Mood: 1 = poor/bad; 2 = fair; 3 = good; 4 = excellent; Education: 1 = primary school; 2 = secondary school; 3 = undergraduate university course; 4 = postgraduate university course; Health status: 1 = excellent; 2 = good; 3 = fair; 4 = poor/bad.

Hypotheses 1 and 2

Four regression models were computed to test the hypothesis that SOC endorsement may be beneficial for cognitive functioning by reducing the frequencies of a range of common cognitive failures (H1), and whether the beneficial effects of SOC endorsement on the frequency of cognitive failures are moderated by individual's experiences of low mood (H2). All predictor variables were centred around zero (i.e., the mean score for each variable was subtracted from individual scores) for the regressions reported here.

Age, gender, education, and self-rated health scores were entered on the first step; the single predictor variables of SOC and mood status were entered on the second step, and the two-way interaction term (i.e., SOC x mood status) was entered on the third step. Individual CFQ facets as well as the overall CFQ scores served as criterion variables. Table 2 shows a summary of the regression results.

For each model, Step 1 was statistically significant and age and health emerged as significant predictors for every CFQ facet while gender and education scores were consistently non-significant. The SOC composite score emerged as significant predictor for all four models and standardized beta coefficients suggest that those who report using SOC competencies may experience fewer cognitive failures in everyday life (i.e., Forgetfulness: β = -.189, t = -3.98, $p < .001$; Distractibility: β = -.142, t = -3.08, $p < .01$; and False triggering: β = -.156, t = -3.29, $p < .01$; Overall CFQ: β = -.140, t = -2.98, $p < .01$).

Mood status also emerged as significant predictor in each model and standardized beta coefficients suggest that individuals who experienced lower mood reported higher levels of cognitive failures (i.e., Forgetfulness: β = .162, t = 3.16, $p < .01$; Distractibility: β = .208, t = 4.17, $p < .001$; and False triggering: β = .161, t = 3.16, $p < .01$; Overall CFQ: β = -.194, t = -3.01, $p < .001$). The interaction term (i.e., SOC x mood) was significant for the models with distractibility and the overall CFQ scale as criterion variables (β = -.122, t = -2.70, $p < .01$ and β = -.098, t = -2.14, $p < .05$ respectively) but not for forgetfulness and false triggering. In line with expectations, overall cognitive failures are reported most frequently by individuals who report low mood and, who at the same time report to employ fewer SOC strategies (see Figure 1). These findings are congruent with hypothesis 2.

Table 6.2: Summaries of regression analysis to examine the effects of SOC and mood on cognitive failures

Cognitive Failures

	Total CFQ				Forgetfulness				Distractibility				False Triggering			
Predictor variables	**Δ R^2**	*B*	*SE*	***β***	**Δ R^2**	*B*	*SE*	***β***	**Δ R^2**	*B*	*SE*	***β***	**Δ R^2**	*B*	*SE*	***β***
Step 1	.116***				.086***				.131***				.102***			
Age		-.15	.03	-.224***		-.07	.02	-.184***		-.11	.02	-.262***		-.07	.02	-.178***
Gender		.51	.88	.03		.40	.45	.043		.08	.53	.007		.91	.49	.089
Education		-.66	.52	-.06		-.31	.27	-.056		-.47	.31	-.072		-.29	.29	-.047
Health		2.86	.59	.236***		1.27	.30	.202***		1.63	.35	.218***		1.59	.33	.230***
Step 2	.060***				.061***				.060***				.049***			
SOC		-.14	.04	-.166**		-.08	.02	-.189***		-.07	.02	-142**		-.07	.02	-.156**
Mood		2.31	.61	.194***		.99	.31	.162***		1.51	.36	.208***		1.08	.34	.161**
Step 3	.009*				.007				.015**				.008			
SOC x Mood		-.10	.05	-.105*		-.04	.03	-.083		-.08	.02	-.122**		-.05	.02	-.089
Final Models:	*F* (7, 395) = 12.82***				*F* (6, 396) = 11.36***				*F* (7, 395) = 14.62***				*F* (7, 395) = 11.69***			

Note: * = $p < .05$. ** = $p < .01$. *** = $p < .001$.

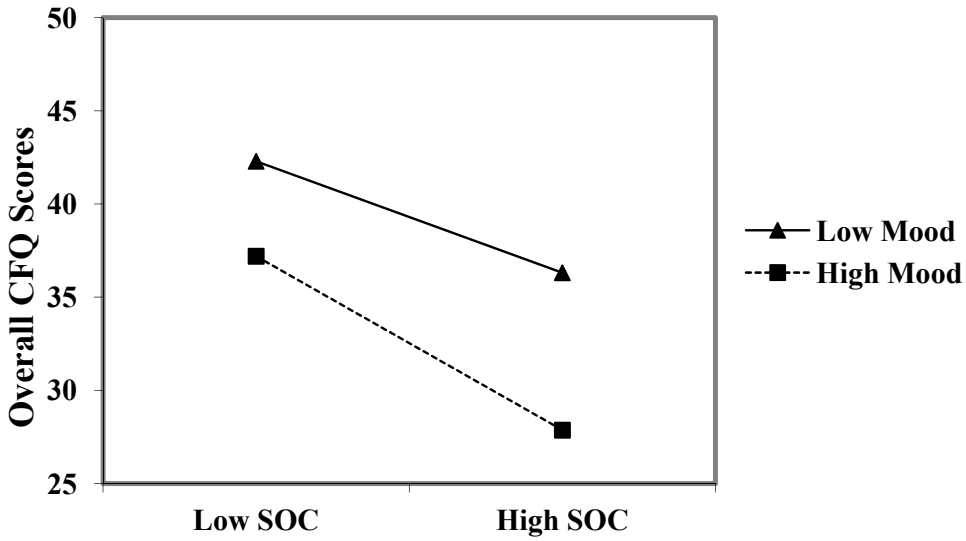

Figure 6.1: The effects of SOC endorsement and mood-ratings on frequency of cognitive failures

Hypothesis 3

The foregoing analysis showed that the MCQ-Strategy composite scores are related to forgetfulness (r = .36, p < .01), and that SOC endorsement accounts for significant variation in everyday forgetfulness scores. Regression analyses were used to determine whether SOC endorsement moderates (increases) the effectiveness of memory compensation efforts (H3). Age, gender, education, and self-rated health scores were entered on the first step; the single predictor variables of SOC and MCQ-Strategy scores were entered on the second step; and the two-way interaction term (i.e., SOC x MCQ-Strategy) was entered at the third step. CFQ-Forgetfulness scores served as the criterion variable. Step 1 was statistically significant (F [4, 399] = 9.16, p < .001, adjusted R^2 = .084), and age (β = -.186, t = -3.84, p < .001) and health (β = -.192, t = 3.97, p < .001) emerged as significant predictors, while gender (β = .053, t = 1.10, p = ns) and education (β = .19, t = 3.97, p = ns) did not. Step 2 accounted for a significant increase in variance explained by the model (i.e., F change = 43.80, p < .001, ΔR^2 = .166; overall F [8, 399] = 22.01, p < .001) and the predictor variables of SOC (β = -.226, t = - 5.06, p < .001) and overall MCQ-strategy usage (β = .331, t = 8.29, p < .001) emerged as significant predictors. Step 3 was non-significant (F change = 1.89; p = ns) suggesting that the hypothesized interaction between SOC

endorsement and individuals efforts to compensate for memory impairment did not emerge within the present data set.

6.5 Discussion

The present investigation set out to examine a number of previously unexamined relationships between cognitive failures, memory compensation efforts, and the meta-theoretical framework of Selective Optimization with Compensation (SOC). Overall, the results offer support for the theory of SOC in this context. As hypothesised, regression results indicated that, after controlling for age, gender, education, and subjective health, SOC endorsement accounted for a significant reduction in overall CFQ scores as well as each individual facet of the CFQ (i.e., Forgetfulness, Distractibility, and False Triggering). These findings contribute to the expanding literature that shows that SOC strategy endorsement promotes successful adaptation to undesirable developmental changes.

Weiland and colleagues (2011) showed that SOC competencies declined as symptoms of depression increased among a sample of individuals with major depressive disorder. Part of the present analysis therefore focused on the moderating effects that mood may have on the SCO/CFQ relationship among this general population sample. As hypothesised, low mood attenuated the beneficial effects that SOC has on the experience of cognitive failures. Although statistically significant, the variation accounted for by the SOC/Mood interaction term was small ($\Delta R^2 = .009$, F change = 4.58) and it was expected that mood would have had a stronger effect on the effectiveness of SOC competencies.

One reason for the relatively small magnitude of the interaction effect may be related to the minimal variation that was observed in the mood scale and the high levels of education among the sample (i.e., only 4% of individuals reported poor mood while 73% reported good and excellent mood over the last six months, and due to the sampling procedure 71% of the sample reported university education). It has been shown that education may be a protective factor against depression (i.e., Bjelland, Krokstad, Mykletun, Dahl, Tell, & Tambs, 2008) and the current data was consistent with these findings as the high levels of education was matched by low levels of depressed mood (education/mood: $r = .14$, $p < .01$). Thus, it is likely that a more representative sample in terms of education and mood would have shown a stronger link between low mood and declining effectiveness of SOC strategies and the

current findings need to be considered in the context of the limited representativeness of the sample used.

Given that the high levels of subjective memory impairment correlate with memory compensation efforts (e.g., Garret, et al., 2010), the current study also examined how SOC endorsement may moderate the effectiveness of memory strategy usage. As expected, SOC scores and MCQ strategy scores accounted for variation in forgetfulness, showing that those who forget more frequently are less likely to report SOC strategy use and are more likely to engage in memory compensation efforts. However, it was hypothesised that SOC endorsement would enhance the effectiveness of memory compensation efforts but the current data did not support this hypothesis. The small magnitude of the association between SOC and memory compensation efforts (i.e., $r = .11$, $p < .01$) was an unexpected finding of this research.

By definition, the memory strategies examined by the MCQ (i.e., external and internal strategies, increased time and effort investment, and relying on others) should reflect memory-specific instances of optimization and/or compensation efforts and high levels of association between the two constructs were expected in the planning stage of this research. These findings are not readily explainable but a plausible explanation for the lack of a stronger link between the two constructs resides in methodological limitations. For the present analysis the domain-general SOC questionnaire was used. It has been suggested that domain-specific SOC scales may have a stronger predictive power than the domain-general SOC scale (i.e., Wiese et al., 2000), and SOC questionnaires have been modified to reflect various domain-specific instances of selection, optimization, and compensation (i.e., work-, family-, partnership-, and exercise-specific SOC questionnaires; Wiese et al., 2000; Young, Baltes, & Pratt, 2007; Ziegelmann & Lippke, 2007). In preparation of this research, we considered modifying the domain-general instructions to facilitate a memory-specific consideration of individual SOC questionnaire items. Such a modification did not seem to be appropriate given that it would have been unusual for participants to consider SOC items (i.e., Person A: "I keep working on what I have planned until I succeed" or Person B: "When I do not succeed right away at what I want to do, I don't try other possibilities for long") in terms of their memory. A memory-specific version of the SOC questionnaire would involve modifications of individual items and this would be a considerable research project in itself. Given the high prevalence of both subjective and objective memory impairment that is associated with the ageing

process, a suggestion for future research may be to develop a memory-specific SOC questionnaire that adequately reflects SOC strategy endorsement in the domain of memory.

The current data showed that increasing age accounted for a reduction in everyday cognitive failures. Rabbitt and Abson (1990) offered a plausible explanation why older people may experience fewer cognitive failures. They argued that older people may adapt to their declining abilities by choosing less complex environments in which cognitive functioning will have to occur and consequently the balance between abilities and everyday challenges would remain relatively constant. This view reflects the selection process outlined within the SOC framework and the current findings would therefore be consistent with this view.

It must be stressed however that the majority of the participants in this research were middle-aged and contrary to the views of many; cognitive abilities do not peak during young adulthood but during middle-age as the period of peak performance for most cognitive abilities lies between the ages of 40 to 60 years of age (Schaie, 1996). The fact that the current findings showed a reduction in cognitive failures with increasing age may thus be due to the age distribution within the sample used. Nonetheless, other studies that have examined ageing-effects on CFQ scores have found similar, seemingly paradoxical results. Rabbit and Abson (1990) examined the prevalence of cognitive failures in a sample of individuals between 50 and 79 years of age and found that participants in their 50s reported more cognitive failures than individuals older than 60. Similarly, Kramer, Humphrey, Larish, Logan, and Strayer (1994) found no significant differences in CFQ scores of younger and older individuals, and Knight, McMahon, Green and Skeaff (2004) also found no CFQ score differences between 65-74 year olds and those who are above 75 years of age. The more recent analyses by Rast et al. (2009) that used the three factor CFQ structure that was used here showed that forgetfulness increased with age, distractibility decreased with age, and false triggering remained stable across age-groups. Rabbitt and Abson's (1990) explanation for a stable CFQ score across age groups is plausible and consistent with the theory of SOC. However, the current study as well as previous studies on ageing-related changes in CFQ scores, are exclusively cross-sectional and it is difficult to determine what may account for the seemingly paradoxical ageing-effects. Longitudinal studies are needed in order to ascertain what may account for these findings.

In summary, the present study offers support for the theory of Selective Optimization with Compensation. SOC endorsement reduced the frequencies of cognitive failures and mood was found to attenuate these effects. Memory compensation efforts were not affected by SOC endorsement and the findings were discussed in the context of methodological limitations and a number of limitations were discussed. Additional research is needed to examine the SOC model in the domain of memory and a memory-specific SOC questionnaire may increase the face validity and predictive power of the SOC model.

CHAPTER VII
MEMORY CONTROL BELIEFS AND EVERYDAY FORGETFULNESS IN ADULTHOOD: THE EFFECTS OF SELECTION, OPTIMIZATION, AND COMPENSATION STRATEGIES

Note:

The research presented in this Chapter has been published in Ageing, Neuropsychology, and Cognition:

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Appendices referred to in this chapter are included for examination purposes only and were not part of the published article in Ageing, Neuropsychology, and Cognition.

7.1 Abstract

Controlling for age, gender, education, and self-rated health, the present study used regression analyses to examine the relationships between memory control beliefs and self-reported forgetfulness in the context of the meta-theory of Selective Optimization with Compensation (SOC). Findings from this online survey ($N = 409$) indicate that, among adult New Zealanders, a higher sense of memory control accounts for a 22.7% reduction in self-reported forgetfulness. Similarly, optimization was found to account for a 5% reduction in forgetfulness while the strategies of selection and compensation were not related to self-reports of forgetfulness. Optimization partially mediated the beneficial effects that some memory beliefs (e.g., believing that memory decline is inevitable and believing in the potential for memory improvement) have on forgetfulness. It was concluded that memory control beliefs are important predictors of self-reported forgetfulness while the support for the SOC model in the context of memory controllability and everyday forgetfulness is limited.
KEYWORDS. Memory Control Beliefs, Selection, Optimization, Compensation, SOC, Everyday Memory.

7.2 Introduction

At the dawn of the 21st century, it is common knowledge that the world's population is rapidly ageing. On a global scale, the observed population of older individuals (60+) rose from 205 million in 1950 to 606 million in 2000 (United Nations [UN], 2002). The UN estimates that the number of individuals in this age-category may reach the 2 billion mark by 2050. In New Zealand, the 2001 census reported that 450,426 individuals (12% of the entire population) are aged 65 or over, and it is estimated that by 2026 this age-group may include almost one million people – a fifth of New Zealand's total population (Statistics New Zealand, 2009). With exponential growth in the ageing population, it follows that scientific attention in the area of cognitive ageing has dramatically increased in recent years.

In general, research has shown that cognitive abilities decline with advancing age (Colsher & Wallace, 1991; Evans et al., 1993; Schaie, 1996; Wilson, Becket, Bennet, Albert, & Evans, 1999). The onset of significant cognitive decline can usually be observed within the fifth decade of life – a time that, by most accounts, lies within the lifespan period of midlife (Lachman, 2001). Compared to other cognitive domains, memory is no exception to the rule as longitudinal and cross-sectional research pinpoints the onset of significant ageing-related decline within the fifth decade of life (Schaie, 1996; Larrabee, Trahan, Curtiss, Levin, 1988; West & Crook, 1990). Despite these laboratory findings, high levels of everyday memory failures are frequently reported for adults of all ages even those who are considerably younger.

A staggering 40% of adults aged 25 to 85 in the Maastricht Ageing Study considered themselves to be forgetful (Ponds, Commissaris, & Jolles, 1997). In line with the generally observed decline in cognitive functioning, a systematic increase in the prevalence of forgetfulness was reported with 29 percent of the younger age group and 52 percent in the oldest age group reporting forgetfulness (Commissaris, Ponds, & Jolles, 1998). Perceived forgetfulness may have considerable consequences for everyday functioning and well-being as higher levels of forgetfulness are associated with lower life satisfaction and well-being ratings, and an increased number of depression and anxiety symptoms (Mordechovich, Merims, & Giladi, 2010; Mol, van Boxtel, Willems, Verhey, & Jolles, 2009). Subjective memory decline may also be related to mild cognitive impairment and even be indicative of an early stage of Alzheimer's disease (Treves, Verchovsky, Klimovitzky, & Korczyn, 2005; Glodzik-Sobanska, et al. 2007; Jessen, et al., 2007).

One widely held belief is that physiological deterioration in the brain results in memory deficits that are inevitable and uncontrollable (Poon, 1985), and that memory will decline irrespective of one's efforts to maintain its function. In contrast, memory may also be viewed as a body of skills that can be developed and maintained over time. The current study examines the latter conception of memory and ageing – focusing on the beneficial effects that beliefs about memory may have on individual's perceptions of everyday forgetfulness.

Memory control beliefs and memory performance

Throughout the ageing process memory performance is known to be affected by metacognitions. Hertzog and Hultsch (2000; p. 417) suggested three distinct categories of metacognitions including "a) knowledge about cognition and cognitive functions, b) the monitoring of the current state of the cognitive system, and c) beliefs about one's own cognitions". The current study examines metamemory – a specific type of metacognition that relates to people's knowledge, awareness and control of their memory (Nelson & Narens, 1990). Among the most salient aspects of metamemory that may have an influence on performance are those about one's beliefs about memory control. Memory control beliefs are metacognitions that refer to whether or not one believes that there is something that can be done to sustain or improve memory (Lachman, 1991). Individuals' beliefs about their control over age-related forgetfulness may vary considerably. It has been shown that older adults tend to believe that forgetfulness is due to irreversible age-related causes, while younger adults tend to attribute forgetfulness to memory-extrinsic factors such as tension and emotional problems, (Ponds et al., 1997), or lack of effort (Lachman, 1990). Thus, as people get older, their beliefs tend to shift from perceptions of forgetfulness as manageable and reversible to beliefs that memory deficits are inevitable, uncontrollable, and age-related.

A sense of control over memory is related to superior memory-test performance. However, this relationship is mediated by memory strategy use, that is, individuals with strong beliefs in memory controllability are more likely to use strategies which in turn improve memory performance (Lachman & Andreoletti, 2006). The current study used the Memory Controllability Inventory (MCI; Lachman, Bandura, Weaver, & Elliot, 1995) to examine memory beliefs. The MCI is a psychometric instrument that examines individuals' beliefs about their memory ability

and controllability across four dimensions including beliefs about ones current level of memory ability (Preset Ability), confidence in the value memory improvement strategies (Potential for Improvement), beliefs in the controllability of memory by effort expenditure (Effort Utility), and beliefs about uncontrollable ageing-related memory decline (Inevitable Decrement).

Selective optimization with compensation: Adapting to ageing-related change

The concept of successful ageing has become a major theme within the cognitive ageing literature. Lifespan developmental psychology posits that successful ageing denotes a process that encompasses the entire lifespan (Freund, 2008). The framework of selective optimization with compensation (SOC; Baltes & Baltes, 1990) defines successful ageing as the relative maximisation and attainment of goals, and the minimization and avoidance of undesired developmental outcomes. SOC suggests key processes (e.g., selection, optimization, and compensation) that individuals may employ to adapt successfully to developmental changes. Briefly, the process of selection involves developing, choosing, and committing oneself to specific goals. In the context of memory, individuals' may differ in the degree to which they choose to improve or maintain their memory function as they age. For example, person A may view ageing-related memory decline as a normal and acceptable fact of life and hence makes no effort to compensate for declining memory performance. Person B on the other hand may worry about declining memory and therefore sets memory performance goals (i.e., I want to improve my memory for names). There are two subtypes of selection: elective selection (i.e., focusing on aiming at desired states [e.g., to get better at remembering names]) and loss-based selection (i.e., restructuring one's goal system when faced with loss in goal-relevant means [i.e., it's ok to forget names at my age]). Optimization denotes the employment of means aimed at goal achievement (e.g., employing memory strategies); and compensation denotes the employment of means that are necessary to maintain a given level of functioning when confronted with a loss in goal-relevant means (e.g., enrolling in a memory programme when previously used memory strategies become ineffective).

There is ample research evidence from self-report studies across the life-span suggesting that the selection of goals, striving to attain selected goals (optimization), and striving to maintain the goal despite a loss in goal-relevant means (compensation) are related to various indicants of successful development. For example, Freund and

Baltes (2002) provided evidence for associations between the SOC components and a range of indicants of subjective well-being including positive emotions, autonomy, environmental mastery, personal growth, positive relations, purpose in life, and self-acceptance. In another study, Gestsdottir and Lerner (2007) found associations between SOC and positive youth development and inverse associations with negative youth development. Wiese, Freund, and Baltes (2000) examined SOC in relation to general well-being, as well as career- and partnership-related successfulness among young adults. Results showed that SOC endorsement was associated with all three domains in expected directions. Thus, for a variety of life domains, employment of SOC strategies is associated with successful development. To the authors' best knowledge, the SOC model has not been utilized in the contexts of everyday memory and memory controllability. The current study therefore set out to examine the relationships between individual's memory control beliefs and experiences of everyday forgetfulness in the context of the theory of Selective Optimization with Compensation.

Hypotheses of the current study

SOC postulates that individuals who select, optimize, and compensate are more likely to age successfully. A sense of control is a key marker of successful ageing, while increasing forgetfulness is undoubtedly an undesirable age-related change. As the beneficial effects of memory control beliefs on performance have been shown to be mediated by memory strategy use, this research examines whether the SOC strategies may also have a mediating effect on the control belief/performance relationship.

The following hypotheses were tested:

H1: Stronger beliefs in memory ability and controllability will account for lower rates of self-reported everyday forgetfulness.

H2: Higher levels of endorsement of the life management strategies of selection, optimization, and compensation will account for lower levels of self-reported forgetfulness.

H3: Selection, optimization, and compensation strategies mediate the relationship between memory control beliefs and levels of self-reported forgetfulness.

7.3 Method

Participants

The sample included 409 members of the general population of New Zealanders (241 [58.9%] females and 168 [41.1%] males) with a mean age of 48.10 years of age (*SD* = 12.94; range 18-85). Table 1 provides a description of the sample in terms of age, education, and self-reported health. Of the participants, 291 (71.1%) identified themselves as employed, 25 (6.1%) as unemployed, 44 (10.8%) as retired, and 45 (11%) as students (4 people did not answer the question).

Table 7.1: Means and standard deviations of education and self-rated heath status by age group

		Age Groups								
	Total Sample 18-81 yrs (n = 409)	18-24 yrs (n = 26)	25-31 yrs (n = 25)	32-38 yrs (n = 30)	39-45 yrs (n = 78)	46-52 yrs (n = 86)	53-59 yrs (n = 80)	60-66 yrs (n = 62)	67-74 yrs (n = 18)	75-81 yrs (n = 4)
Education *M (SD)*	3.14 (.84)	2.96 (.77)	3.60 (.65)	3.70 (3.70)	3.00 (.84)	3.12 (.86)	3.02 (.86)	3.19 (.87)	2.89 (.83)	3.00 (1.0)
Health *M (SD)*	2.02 (.73)	2.38 (.80)	2.00 (.82)	2.13 (.78)	2.00 (.66)	1.96 (.78)	1.99 (.67)	2.02 (.70)	2.00 (.77)	1.33 (.58)

Note: Education: 1 = primary school; 2 = secondary school; 3 = undergraduate university course; 4 = postgraduate university course; Health: 1 = excellent; 2 = good; 3 = fair; 4 = poor/bad.

Measures

Background Measures. A questionnaire was used to assess age, gender, self-ratings of current health status (i.e., 1 = *excellent;* 2 = *good;* 3 = *fair;* 4 = *poor/bad*) and education (1 = *primary school*; 2 = *secondary school*; 3 = *undergraduate university course*; 4 = *postgraduate university course*).

Memory Controllability Inventory (MCI; Lachman, Bandura, Weaver, & Elliott, 1995). The 12-item MCI assesses beliefs about memory ability and controllability. The MCI is comprised of four sub-scales: Present Ability (e.g., "I can remember the things I need to"); Potential Improvement (e.g., "I can think of strategies to help me keep up my memory"); Effort Utility (e.g., "If I work at it, I can improve my memory"); and Inevitable Decrement (e.g., "There's not much I can do to keep my memory from going downhill"). A 4-point Likert scale was used as response format (*strongly disagree, disagree, agree, strongly agree*). Total scores can range from 3 - 12 for each subscale, and higher scores denote a more positive conception of one's memory capabilities (items were reverse scored where necessary). Previous research suggests that the MCI scales possess acceptable levels of internal reliability and construct validity (Lachman, et al., 1995).

Selection, Optimization, and Compensation Questionnaire (SOC; Freund, & Baltes, 2002). The 12-item, domain general, short-form of the SOC questionnaire was used to examine the two aspects of selection (elective [ES] and loss-based [LBS]), optimization, and compensation. The measure has equivalent psychometric properties to the 48-item version (Freund, & Baltes, 2002). Each of the 12 items consisted of two statements, characterising fictitious individuals who either adhere (Person A) or do not adhere (Person B) to SOC-related life management strategies. For example:

Elective Selection. Person A: "I concentrate all my energy on a few things" or Person B: "I divide my energy among many things".

Loss-Based Selection. Person A: "When things don't go as well as before, I choose one or two important goals" or Person B: "When things don't go as well as before, I still try to keep all my goals".

Optimization. Person A: "I keep working on what I have planned until I succeed" or Person B: "When I do not succeed right away at what I want to do, I don't try other possibilities for long".

Compensation. Person A: "When something in my life isn't working as well as it used to, I ask others for advice or help" or Person B: "When something in my life isn't working as well as it used to, I decide what to do about it myself, without involving other people".

Participants were asked to choose which of the two individuals is most similar to them and after selecting the item that best describes their behavior, they were asked to rate the degree of similarity between their behavior and the behavior they selected on a 4-point scale ranging from 1 (*a little*) to 4 (*exactly*). Thus, scores on each item can range from a 0 (non-SOC strategy selected) to 4 (SOC strategy selected and an exact degree of similarity indicated), and total scale scores can range from 0 to 48, with higher scores denoting higher levels of SOC endorsement. The SOC questionnaire has adequate construct validity (Freund, & Baltes, 2002) and a number of studies have provided evidence that selection, optimization, and compensation are related to various subjective indicators of successful development (e.g., Gestsdottir & Lerner, 2007; Freund, & Baltes, 2002; Wiese, et al., 2000).

Cognitive Failures Questionnaire - Memory Scales (CFQ; Broadbent, Cooper, Fitzgerald, & Parkes, 1982). The full CFQ is a 25-item self-report inventory that inquires about a person's proneness to committing cognitive slips and errors in the completion of everyday tasks over the past 6 months. The scale contains four distinct factors including Distractibility, Memory, Blunders, and Memory for Names. Only the Memory and Memory for Names Scales were used in the current study (see Table 2), and the scores of both scales were combined to serve as a measure of everyday forgetfulness. The response format for the CFQ-Memory scale was a 4-point Likert-scale (*never, sometimes, often, always*) and scores can range from 0 to 36 (higher scores denote higher levels of forgetfulness). The full CFQ has been shown to be a valid and reliable measure in a cohort of healthy older New Zealanders (Knight, McMahon, Green, & Skeaff, 2004). Internal consistency reliability estimates for the Memory and Memory for Names scales of the CFQ have been reported to range from .75 to .86 and .75 to.76 respectively (Wallace, 2004; Wallace, Kass, & Stanny, 2002).

Table 7.2: Items of the CFQ-Memory Scale

Item	Question
1	Do you forget whether you've turned off a light or a fire or locked the door?
2	Do you find you forget which way to turn on a road you know well but rarely use?
3	Do you fail to see what you want in a supermarket?
4	Do you find you forget appointments?
5	Do you forget where you put something?
6	Do you throw away the thing you want and keep what you meant to throw away?
7	Do you forget items to buy at the shop?
8	Do you fail to listen to people's names?
9	Do you forget people's names?

Procedure

All participants received an electronic version of an informed consent document which stated clearly that: (a) involvement in the study was voluntary and could be terminated at any time without consequences; (b) no self-identifying information would be collected, thereby safeguarding respondents' anonymity; (c) the data would be kept confidential (i.e., only the researcher and the computer programmer associated with the psychology department had access to the data-file); and (d) upon completion of the study, participants would be given access to a document outlining the study's purpose and main findings. The survey was located on the website of the university associated with the researchers. Only the computer programmer was able to access the data file via a secure password protected entry point.

A number of procedures were used to recruit participants. Firstly, the study was advertised online - a Facebook advertisement[4] appeared on personal Facebook interfaces. Upon clicking on the advertisement, participants were directed to the information sheet and survey[5]. Secondly, advertisements[6] were placed into two local newspapers. These adverts contained brief descriptions of the study and the details needed to access the online survey. Thirdly, an e-mail message was sent to a graduate student list associated with the researchers' institution. The message contained a brief

[4] Appendix A.0
[5] Appendix A.2
[6] Appendix A.1

outline of the study and the link to the online survey. Recipients were asked to forward the message to friends and acquaintances.

7.4 Results

Analysis

Alpha coefficients, means, standard deviations, and correlation coefficients for all psychometric measures are presented in Table 3. Most correlations were significant and magnitudes ranged from small to large. The indicants of SOC were all significantly intercorrelated ranging from .20 (elective selection and compensation) to .52 (optimization and compensation) and averaged SOC component scores were used to calculate an overall SOC score. The sub-scales of the MCI were also intercorrelated in expected directions, ranging from .29 (present ability and effort utility) to .55 (present ability and potential for improvement). Associations between the measures of interest and control variables were generally low: *r*'s ranged from .00 (loss-based selection and age) to .23 (gender and potential for memory improvement beliefs).

Table 7.3: Means, standard deviations, alpha coefficients and intercorrelations of all psychometric measures

		M	*SD*	1	2	3	4	5	6	7	8	9	10	11	12
1	SOC Elective Selection	2.29	1.02	(.58)											
2	SOC Loss-based Selection	3.59	1.06	.38**	(.44)										
3	SOC Optimization	6.22	1.01	.26**	.36**	(.66)									
4	SOC Compensation	4.00	1.06	.20**	.25**	.52**	(.46)								
5	SOC (Composite)	22.66	2.83	.61**	.68**	.80**	.72**	(.71)							
6	MCI Present Ability	8.62	1.69	.08	.13*	.29**	.18**	.25**	(.73)						
7	MCI Potential Improvement	8.60	1.45	.09	.14**	.24**	.18**	.24**	.55**	(.56)					
8	MCI Effort Utility	9.00	1.39	.05	.15**	.10*	.14**	.15**	.29**	.43**	(.69)				
9	MCI Inevitable Decrement	7.00	1.65	.05	-.13**	-.17**	-.18**	-.16**	-.41**	-.52**	-.37**	(.73)			
10	CFQ Memory	12.33	2.76	-.001	-.05	-.25**	-.10*	-.14**	-.49**	-.33**	-.09*	.24**	(.77)		
11	CFQ Names	4.8	1.18	-.005	-.09	-.19**	-.16**	-.16**	-.34**	-.30**	-.16**	.24**	.37**	(.65)	
12	CFQ Forgetfulness	17.21	3.39	.02	-.08	-.24**	-.14**	-.16**	-.50**	-.36**	-.10*	.26**	.95**	.65**	(.78)

Note: $N = 409$. Alpha coefficients are in parenthesis. * = $p < .05$. ** = $p < .01$.

Hypothesis 1

To examine the impact of memory control beliefs on the experience of forgetfulness, hierarchical regression analysis was conducted. Age, gender, education, and self-rated health were entered at step 1 and the four MCI sub-scales were entered at step 2. CFQ-Memory scores served as the dependent variable. Step 1 was statistically significant (F [4, 403] = 6.77, $p < .001$, adjusted $R^2 = .05$). Age ($\beta = -.12$, $t = -.24$, $p < .05$) and self-rated health ($\beta = .21$, $t = 4.20$, $p < .001$) accounted for variation in CFQ-Memory scores while education ($\beta = -.04$, $t = -.73$, p = ns) and gender ($\beta = -.03$, $t = -.63$, p = ns) did not. Step 2 accounted for a significant increase in variance (i.e., F change = 32, $p < .001$; overall F [7, 396] = 20, 43; $p < .001$, $\Delta R^2 = .28$), present ability ($\beta = -.41$, $t = -.78$, $p < .001$), potential for improvement ($\beta = -.13$, $t = -2.14$, $p < .05$), and effort utility ($\beta = .11$, $t = 2.24$, $p < .05$) emerged as significant predictors while inevitable decrement ($\beta = .05$, $t = 1.05$, p = ns) did not. Hypothesis 1 is thus supported: After controlling for age, education, and self-rated health, three memory control beliefs facets jointly accounted for a 22.7% reduction in self-reported forgetfulness.

Hypothesis 2

To examine whether SOC strategy endorsement accounts for a reduction in self-reported forgetfulness, hierarchical regression analysis was conducted. Age, gender, education, and self-rated health were entered at step 1, the SOC variables of elective and loss-based selection, optimization and compensation were entered at step 2, and CFQ-Memory scores served as the dependent variable. Step 1 was statistically significant (F [4, 403] = 6.77, $p < .001$, adjusted $R^2 = .05$). Age ($\beta = -.12$, $t = -2.39$, $p < .05$) and self-rated health ($\beta = .21$, $t = 4.20$, $p < .001$) accounted for variation in CFQ-Memory scores while gender ($\beta = -.04$, $t = -.72$, p = ns) and education ($\beta = -.04$, $t = -.73$, p = ns) did not. Step 2 accounted for a significant increase in variance (i.e., F change = 6.93, $p < .001$, $\Delta R^2 = .11$; overall F [8, 395] = 7.05; $p < .001$, adjusted $R^2 = .11$). Optimization ($\beta = -.22$, $t = -3, 56$, $p < .001$) emerged as a significant predictor while the two measures of selection (ES: $\beta = .09$, $t = 1.70$; LBS: $\beta = -.03$, $t = -.48$) and compensation ($\beta = -.03$, $t = -.44$) did not. Hypothesis 2 is thus partially supported as only optimization emerged as a significant predictor of CFQ-Memory scores.

Hypothesis 3

Baron and Kenny (1986) explain that a variable may function as a mediator if three conditions are met: 1) the independent variable is a significant predictor of the dependent variable, 2) the mediator is related to the dependent variable and 3) the independent variable is a significant predictor of the mediator. The above analysis indicated that the first two requirements were met for the current data. To test whether the third requirement was met (i.e., whether memory control beliefs predict SOC endorsement scores), overall SOC and MCI scores were computed. Regression analysis showed that MCI scores account for a significant amount of variations in SOC composite scores (F [1, 406] = 23.02, $p < .001$, $R^2 = .054$), confirming that the third condition was also met. Mediation occurs when the relationship between the independent variable and the dependent variable is statistically lower than before the introduction of the mediator variable. The Baron and Kenny causal step approach for detection of mediation effects has been criticised for having low statistical power (e.g., Hayes, 2009). By convention, the social sciences usually aspire to obtain a statistical power of .8 (Cohen, 1988). Fitz and MacKinnon (2007) have provided empirical estimates of sample sizes and effect sizes needed to obtain .8 power for several different approaches that may be used to determine mediation effects. With the current data (e.g., present ability/forgetfulness: $r' = -.42$; potential for improvement/forgetfulness: $r' = -.35$; and inevitable decrement/forgetfulness: $r' = .24$; $N = 409$), the conventional power criteria was met for each of the three mediation models reported below.

Results of the analyses above indicated that of the SOC life management strategies, only optimization and compensation qualify as potential mediators for the memory control beliefs/forgetfulness relationship as the measures of selection were unrelated to forgetfulness (see Table 3). To test for mediation, four multiple regression equations - one for each belief facet - were run. Age, gender, education, and self-rated health were controlled for in step 1. The individual MCI sub-scale scores were entered at step 2, and optimization and compensation scores were entered at step 3. CFQ-Memory scores served as the dependent variable. For the effort utility model, step 2 did significantly contribute to the equation and thus the model is not reported here. Table 4 presents the results of the regressions. Step 1 was statistically significant (F [4, 403] = 6.77, $p < .001$, adjusted $R^2 = .064$), but only age ($\beta = -.12$, $t = -2.39$, $p < .05$) and self-rated health ($\beta = .21$, $t = 4.20$, $p < .001$) emerged as significant

predictors, while gender (β =-.03, t = -.63, p = ns) and education (β = -.04, t = -.73, p = ns) did not.

Model for Present Ability Beliefs: After entering present ability scores in step 2, the equation significantly improved (ΔR^2 = .21, p = .001). The standardised beta coefficient for present ability declined from -.472 to -.442 in step 3, and the addition of optimization (but not compensation) did significantly improve the model in step 3 (ΔR^2 = .019, p <.01), indicating that optimization partially mediated the relationship between present ability beliefs and forgetfulness.

Model for Potential for Improvement Beliefs: After entering potential improvement scores in step 2 the equation significantly improved (ΔR^2 = .104, p < .001). The standardised beta coefficient for potential improvement did decrease from -.347 to -.319 in step 3. Compensation did not emerge as significant predictor while optimization was significant (ΔR^2 = .036, p < .001), indicating that optimization partially mediates the relationship between potential for improvement beliefs and forgetfulness.

Model for Inevitable Decrement: After entering inevitable decrement scores in step 2, the equation significantly improved (ΔR^2 = .055, p < .001). The standardised beta coefficient for inevitable decrement declined from .240 to .215 in step 3 (ΔR^2 = .145, p < .001). Compensation did not emerge as significant predictor while optimization accounted for a small but significant amount for variation, suggesting that optimization partially mediates the relationship between inevitable decrement beliefs and forgetfulness.

Table 7.4: Summary of regression analyses for memory beliefs facets, optimization, and compensation as predictors of forgetfulness

		ΔR^2	*B*	*SE*	*β*
Model for Present Ability Beliefs (PA)					
Step 2		.264**			
	Age		-.023	.011	-.086*
	Gender		-.260	.298	-.038
	Education		.146	.199	.036
	Health		.575	.203	.124**
	PA		-.945	.088	-.472**
Step 3		.280**			
	Age		-.025	.011	-.094*
	Gender		-.239	.295	-.035
	Education		.187	.177	.046
	Heath		.545	201	.118**
	PA		-.885	.089	-.442**
	Optimization		-.450	.160	-.134**
	Compensation		-.069	.153	-.022
			Overall Model: F (7, 396) = 23.37, p < .001		
Model for Potential for Improvement Beliefs (PI)					
Step 2		.107***			
	Age		-.025	.012	-.096*
	Gender		.251	.325	.037
	Education		.195	.194	.048
	Heath		.748	.216	.161**
	PI		-.810	.115	-.347***
Step 3		.189***			
	Age		-.028	.012	-.107*
	Gender		.238	.319	.035
	Education		.272	.191	.067
	Heath		.712	.213	.149**
	PI		-.747	.114	-.319**
	Optimization		-.591	.169	-.176**
	Compensation		-.115	.162	-.036
			Overall Model: F (7, 396) = 14, 42, p < .001		
Model for Inevitable Decrement Beliefs (ID)					
Step 2		.107***			
	Age		-.025	.012	-.097*
	Gender		-.044	.330	-.006
	Education		.010	.196	.002
	Heath		.897	.219	.194**
	ID		.493	.099	.240**
Step 3		.145**			
	Age		-.028	.012	-.108*
	Gender		-.035	.323	-.005
	Education		.104	.193	.026
	Heath		.825	.217	.178**
	ID		.441	.098	.215***
	Optimization		-.644	.173	-.192**
	Compensation		-.103	.167	-.032
			Overall Model: F (7, 396) = 10, 74, p < .001		

Note: * = p < .05. ** = p < .01. *** = p < .001. PA = Present Ability Beliefs, PI = Potential for Improvement Beliefs, ID = Inevitable Decrement Beliefs.

7.5 Discussion

Previous research has shown that the beneficial effects of memory control beliefs on memory performance are partially mediated by memory strategy use. The aim of the present study was to examine the effects of memory control beliefs in the context of everyday memory and to determine whether the strategies of selection (elective and loss-based), optimization, and compensation are additional mediators for the control / performance relationship. Findings indicate that memory control beliefs are strong predictors of everyday forgetfulness. Specifically, even after controlling for the effects of age, gender, education, and self-rated health, memory control beliefs accounted for a 22.7% reduction in self-reported forgetfulness. The data indicated that beliefs about one's current memory ability account for most of this effect, followed by beliefs in the potential for memory improvement and beliefs about the controllability of memory by means of effort expenditure. Despite a significant correlation between inevitable decrement beliefs and forgetfulness, beliefs about inevitable memory decline had no significant effect on self-reported forgetfulness when all four facts of the MCI were included in the regression model simultaneously. Nonetheless, the direct path between inevitable decrement and forgetfulness was significant in the mediation model - suggesting that beliefs in inevitable memory decline account for variation in self-reported forgetfulness.

The hypothesised relationship between SOC endorsement and self-reported forgetfulness was partially supported. Correlation coefficients suggested that higher scores on the measures of optimization and compensation, but not selection, were associated with lower levels of forgetfulness. Subsequent regression analysis suggested that only optimization accounted for variation in forgetfulness. Using Baron and Kenny's (1986) guidelines, the test for mediation for the control belief/forgetfulness relationship included optimization and compensation but not selection as potential mediators. Regression analyses showed that optimization, if only to a small extent, mediates the relationship between control beliefs and forgetting, while compensation had no mediating effect.

A key question that arises from these findings is why only optimization and to some degree compensation, but not selection, related to memory control beliefs and self-reported forgetfulness? One possible answer resides in methodological limitations. A likely explanation for the lack of relationships between selection and other key variables may be that SOC was not assessed specifically for the domain of memory.

The instructions and items of the domain general SOC questionnaire are frequently modified to examine specific domains. For example, recent research has used work-, family-, partnership-, and exercise-specific SOC questionnaires (i.e., Young, Baltes, & Pratt, 2007; Ziegelmann & Lippke, 2007; Wiese et al., 2000). Wiese et al. (2000) indicated that domain-specific SOC scales may provide better predictive power, and thus, future research should use domain specific SOC questionnaires. In the planning stages of the current study, consideration was given to the possibility of modifying the instructions of the domain-general SOC questionnaire to create a memory-specific version. However, we decided against this as it appeared to be a rather unusual request to think about individual SOC items (e.g.: I concentrate all my energy on a few things" [person A] versus "I divide my energy among many things [person B]) in terms of one's memory. We believe that a memory-specific SOC questionnaire could be constructed, but would involve modifications of the SOC items rather than the instructions - a considerable research project in itself. While this was outside the scope of the current research, a task for future researchers may be to develop a SOC questionnaire that has adequate face and construct validity for the domain of memory.

Another possibility that may account for the low predictive value of SOC is the use of self-report measurement. Although SOC endorsement is not related to social desirability (Freund & Baltes, 2002), it is impossible to determine whether participants actually use SOC strategies or simply stated a preference for these strategies. Similarly, it is also unclear how well the strategies are executed if they are used. It is conceivable that individuals who report high levels of selection and compensation, despite infrequent or poor execution of these strategies, may have attenuated the expected relationships with other key variables. Because of these uncertainties, future researchers may be well advised to employ behavioral rather than self-report measures of SOC as has been done in previous research (e.g., Gignac, Cott, & Badley, 2002; Li, Lindenberger, Freund & Baltes 2001).

Most alpha coefficients (see Table 7.2) for the SOC measures are extremely low in the current study. While this may be indicative of low internal consistency, it must be stressed that high homogeneity is not an expectation for the elements of SOC as they in themselves denote rather heterogeneous phenomena (e.g., optimization may refer to increased effort expenditure, acquiring new skills, modelling successful others, etc.; see Baltes, 1997 for a discussion of this issue).

Finally, it must be stressed that the current data are based on a sample with above average levels of educational achievement. Due to the sampling procedure (that included a message to a postgraduate university student email list), the educational achievement of the sample was extremely high, with 71% of the sample reporting either undergraduate or postgraduate university education. The generalisability of the findings is therefore limited as the data may not be reflective of the general population of New Zealanders in terms of education.

In conclusion, while memory control beliefs were found to be important predictors of self-reported everyday forgetfulness, only limited support was found for the hypothesis that SOC endorsement acts as a mediator for this relationship. These findings complement previous research that indicated that a higher sense of memory control improves memory performance in laboratory-based memory tests. The current data therefore strengthen the argument that memory interventions that aim to increase objective/subjective memory performance may effectively improve memory by modifying memory control beliefs (i.e., Lachman & Andreoletti, 2006). The possibility that the limited support for the Theory of Selective Optimization with Compensation was due to methodological issues was explored and a number of limitations were discussed. More research is needed to examine the SOC model in specific cognitive domains such as memory. As previous research has suggested, we close by emphasising that behavioural, domain-specific (i.e., memory) SOC assessment may lead to increased predictive power of the SOC model.

CHAPTER VIII

IMPROVING MEMORY IN MIDLIFE: A MULTIPLE CASE STUDY EVALUATION OF A GROUP-BASED MEMORY PROGRAMME FOR HEALTHY MIDDLE-AGED INDIVIDUALS

Note:

This chapter is presented in manuscript format and it is intended to submit this manuscript to the Journal of Applied Developmental Psychology for peer-review and possible publication. The appendices referred to in this chapter are included for examination purposes only and are not part of the manuscript that will be submitted to Applied Developmental Psychology.

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8.1 Abstract

Significant ageing-related memory decline begins during the developmental stage of midlife. Surprisingly, the midlife cohort is typically excluded from studies that evaluate clinically developed memory interventions as most memory programmes are intended for individuals who are older than 65 years of age with mild to moderate memory impairments. This multiple case study ($N = 5$) examined the effectiveness of a six week memory group-intervention that was specifically designed to improve memory for normally ageing, middle-aged individuals. The programme contained four treatment components including: 1) Memory goal selection and pursuit, 2) Memory and ageing education, 3) Memory strategy training, and 4) Group discussions about everyday memory experiences. The programme's effectiveness was evaluated by a before/after design with a three month follow-up. The data showed improvements in objective and subjective memory performance and worries about memory performance decrements diminished. At follow-up, the benefits of the programme where generally maintained. While the findings are encouraging, a larger scale study is needed to establish the efficacy of the programme.

KEYWORDS: Memory intervention, Midlife, Normal ageing

8.2 Introduction

Historically, developmental psychologists have focused their attention on ageing processes that occur during the phases of childhood and adolescence. Within the past four to five decades, this historical trend has changed, and research into adult development is on the increase. Much of the research effort in this area has focused on later life, and when the entire lifespan is considered, a scarcity of midlife research becomes apparent (Staudinger & Blunck, 2001). The ageing-related literature in psychology is of a sizeable dimension, and to date, numerous age categorisation systems have been proposed. Among the categories that are currently in use to distinguish developmental stages in adulthood are 'young-adults', 'adults', 'young middle-aged adults', 'middle-aged adults', 'old middle-aged adults', 'young-old adults', 'old-old adults', 'oldest-old adults', 'young elderly', and the 'old elderly'. The age ranges associated with these categories may vary considerably between writers and overlap between categories is common. Midlife is no exception to the general age-band confusion as conceptualisations of the midlife period range from 20 to 40 years (Lachman, 2004). For the purposes of the present study, midlife is defined as the period of life between 40 and 65 years of age. This 25 year period was chosen on the basis that it is the most common conception of midlife (i.e., Lachman, Lewkowics, Peng, 1994; Lachman & James, 1997), and therefore allows for the maximum level of comparability with data from the existing literature.

Significant ageing-related decrements in memory usually start in midlife (Schaie, 1996; Larrabee, Trahan, Curtiss, & Levin, 1988; West & Crook, 1990). Subjective forgetfulness begins to increase earlier than objective decline with 33% of young middle-aged people (40-50 years of age) and 40% of old middle-aged people (55-65 years of age) reporting everyday forgetfulness (Ponds, Commissaris, & Jolles, 1997). More than half of these people perceive their forgetfulness as a hindrance, and about 50% stated that they worry about their forgetfulness. Because research consistently shows that objective and subjective memory decline starts during midlife, it may be said that this reflects a normal or *age-appropriate* developmental change.

Memory interventions are almost exclusively intended for elderly (65+) with clinical conditions such as Mild Cognitive Impairment (MCI), more severe forms of cognitive disorders such as Alzheimer's disease, or individuals with recognised neurological conditions such as acquired brain injury. Reviews of studies designed for people with MCI (Stott & Spector, 2010), dementias such as Alzheimer's disease (De

Vreese, Neri, Fioravanti, Belloi, & Zanetti, 2001), and acquired brain injury (Rohling, Faust, Beverly, & Demakis, 2009) generally indicate that memory improvement efforts enhance performance for individuals of these populations. Likewise, memory interventions have also been shown to be an efficacious treatment for elderly *without* clinically significant impairment. Three meta-analyses indicate that, for normally ageing older people, interventions can improve both objective and subjective performance levels (Verhaeghen, Marcoen, & Goossens, 1992; Floyd, & Scogin, 1997; Metternich, Kosch, Kriston, Härter, & Hüll, 2010).

Specific intervention models that have been shown to reduce memory difficulties among the normally ageing elderly include the Concentration and Mnemonic Training Model (CMT; Yesavage, 1983, 1984; Yesavage, Rose, & Spiegel, 1982), largely focusing on the training of mnemonic strategies, the Cognitive Restructuring Model (CRM; Lachman, Steinberg, & Trotter, 1987; Lachman, Weaver, Bandura, Elliott, & Lewkowic, 1992) which emphasises participants' sense of control over memory and the Cognitive Behavioural Model of Everyday Memory (CBMEM; McDougall, 2009) specifically focusing on everyday memory - emphasising memory self-efficacy, stress reduction, and memory strategies. The specific intervention components that bring about improvement differ for self-reports of memory and objectively measured memory. For subjective memory, expectancy change interventions such as cognitive restructuring or psychoeducation account for most improvement while mnemonic training is a more effective intervention for objective memory improvement (Metternich, et al., 2010). Both, basic and applied memory research, crucially contributes to memory improvement efforts for elderly with or without significant memory impairment and those with acquired neurological conditions such as brain injury.

Considering the increasing size of the ageing population, the acceleration of memory decline in old age, and the increased probability of cognitive disorders such as MCI and dementias, the increasing emphasis on memory interventions for older people makes sense. However, it is now well known that memory significantly declines during *midlife* and that this cohort has also expressed considerable worries about their increasing levels of forgetfulness. Surprisingly, middle-aged individuals have largely been excluded from clinical memory intervention research and practice.

Rationale and objectives of the current memory intervention programme

The fact that healthy, middle-aged adults experience considerable levels of distress and inconvenience because of age-appropriate forgetfulness has not been given sufficient attention by psychologists. The current research literature suggests that clinically developed memory programmes have thus far only been used with people above the age of 65 years. Programmes that aim to reduce forgetfulness among the successfully ageing, middle-aged population are thus required.

For a number of reasons, midlife would constitute an ideal time for memory interventions to take place. One argument for midlife interventions relates to the notion that an establishment of a cognitive reserve in midlife may delay or even compensate for cognitive decline in old age (Willis et al., 2010). Despite the observation that forgetfulness increases in midlife, other cognitive performances are generally at a lifetime peak for most individuals during this period (Eichorn, Clausen, Haan, Honzik, & Mussen, 1981; Hultsch, et al., 1999; Schaie, 1996). Midlife would therefore be an ideal time for interventions to take place as higher levels of general cognitive ability would increase the likelihood of training gains (Martin & Zimprich, 2005). There may also be biological advantages to memory improvement in midlife. A recent study suggests that improvements in episodic memory during midlife are associated with significantly larger hippocampal volume in old age compared to those individuals whose midlife episodic memory remained stable or declined (Borghesani, et al., in press). These authors indicated that midlife memory improvement may optimise hippocampal ageing and suggest that interventions that promote brain health should start during midlife rather than old age.

The opportunity to take advantage of midlife strengths that can maximise training gains and possibly increasing cognitive reserves for later life are good reasons for midlife memory interventions. However, an even more compelling argument for memory intervention in midlife is of course the fact that objective as well as subjective memory begins to decline notably during this stage of life rather than in old age and those in midlife have expressed concerns about their memory.

The overall goal of the research presented here was to develop, implement, and evaluate a memory programme that was specifically designed for the normally ageing midlife cohort. It was expected that scores on the objective and subjective memory measures would improve as a result of the group intervention. Secondly, given the high levels of worry about declining memory abilities in midlife, the programme also

aimed to change individual's perceptions and beliefs about memory and ageing as a means to reduce these worries. It was therefore expected that worries would decline and that individual's confidence in memory ability and controllability would increase.

8.3 Method

Participants

Participants (N = 5) were middle-aged females (M_{age}= 56.4; SD = 6.32; range = 48-64). Levels of education where high, two participants reported completion of undergraduate university courses and three had completed post-graduate university courses. All participants were professionals and employed/self-employed during the course of the programme.

Study design and procedure

A before/after multiple-case study design was used to evaluate the impact of the 6-week memory group intervention. A facilitator manual[7] was written and the programme was then offered as a service by the outpatient psychology clinic associated with the researchers' university and was advertised as the Midlife Memory Programme. Potential clients learned about the programme via flyer[8] and poster[9] advertisements that invited middle-aged people to take part in a memory programme designed to assist people for whom forgetfulness might be a hindrance in their everyday life. The entire programme consisted of nine hours contact with one of two clinical psychologists and a 186 NZ$ charge applied for programme participation to part cover for the instructors time.

There were two inclusion criteria for research participation – being middle-aged (40-65), and the probable absence of significant cognitive impairment. Thus, prior to baseline assessment, Addenbrooke's Cognitive Examination – Revised (ACE-R, Mioshi, Dawson, Mitchell, Arnold & Hodges, 2006), a valid dementia screening test sensitive to early cognitive dysfunction, was administered to ensure that participants were not experiencing clinically significant cognitive impairments. No participant showed significant cognitive deficits on the ACE-R clinically. Upon completion of the baseline assessment, participants were given a folder and a 10 page

[7] Appendix A.5
[8] Appendix A.3
[9] Appendix A.4

pre-programme hand-out[10] that provided an overview of the programme. Any questions about the programme were answered and participants were asked to read the hand-out before Session 1 to familiarise themselves with the programme structure and content.

During each session, participants were provided with hand-outs[11] to add to the folder including detailed information about memory systems and processes, memory and ageing, memory strategies, contextual influences on memory, and stress reduction techniques.

Intervention

The intervention was facilitated by one of two experienced clinical psychologists and a postgraduate psychology student (the lead author), and consisted of six weekly 1.5 hour sessions. The group was held at a university-based outpatient psychology clinic. Table 1 provides an overview of the programme. All intervention modules are based on evidence-based memory research and were customised to the memory experiences and needs of healthy middle-aged people.

The four modules of the Midlife Memory Programme are outlined below:

1) ***Memory goal setting and pursuit:*** When goals are set, motivation, attention, and goal-directed behaviour increase (Bandura, 1989; Locke & Latham, 2002; Schunk, 1991). A number of studies have shown that selecting memory goals and striving to attain them improves memory self-efficacy as well as performance in the laboratory (e.g., Stadtlander & Coyne, 1990; West, Welch & Thorn, 2001; West, Thorn, & Bagwell, 2003; West, Bagwell, & Dark-Freudeman, 2005). For the Midlife Memory Programme, it was ensured that clients choose person-specific, attainable memory goals at the outset of the programme and goal attainment status was continuously measured and reviewed with clients throughout the programme.
2) ***Memory and ageing education:*** It has been shown that the most efficient strategy to reduce negative beliefs about everyday memory failures is to educate people about the difference between normal ageing-related forgetfulness and pathological memory failures (Mol, Groot, Willems, & Jolles, 2006). Floyd and Scogin's (1997) analysis also indicate that memory

[10] Appendix A.6
[11] Appendices A.10-A.17

programmes which incorporate education - promoting a realistic understanding of age-effects on memory processes - are more effective than those without education modules. The educational aspect of the programme focused on providing information about: 1) Memory systems and processes and how they relate to the ageing process, 2) Normal and pathological aspects of memory ageing, 3) Contextual factors that impact on memory performance and 4) Protective and risk factors for cognitive decline.

3) ***Memory strategy and skills training:*** Two meta-analytic studies that mainly focused on the effects of mnemonic training suggest that mnemonic training enhances both subjective and objective memory performance (Floyd & Scogin, 1997; Verhaeghen, Marcoen, & Goossens, 1992 respectively). The current programme involved teaching a range of internal and external memory strategies (i.e., Attention strategies, Visualisation, Chunking, Namtures, Method of Loci, Pegword method, Errorless learning, Stories, Acronyms, Acrostics, Categorisation/Organisation, Diaries, Logical location).
4) ***Group discussions about everyday memory experiences:*** Gerontologists have long recognised the benefits of group discussions with same-age peers (e.g., Chene, 1994; Clough, 1992), as the sharing of personal experience makes learning more meaningful and thus is conducive to the learning process (West, Welch, & Yassuda, 2000). Group discussions enhance comprehension as ideas are shared and cooperative learning leads to higher levels of motivation and achievements (Millis, Davidson, & Cottell, 1994). West et al. (2000) indicated that group discussions may enhance effectiveness of memory strategies because a particular strategy is "advertised" by same-age peers, who report successful application of the technique. To facilitate group discussions in our programme, clients were encouraged to write a simple memory diary (i.e., recording instances of forgetfulness, the circumstances that may have let to forgetting and a worry rating) for the duration of the course. The idea behind this was that clients could share their memory experiences such as specific instances of forgetting, or (un)successful strategy application with their peers at the beginning of each session.

Table 8.1: Structure of the Midlife Memory Programme

Session 1	Session2	Session 3	Session 4	Session 5	Session 6
Introduction	Diary Discussion	Diary Discussion	Diary Discussion	Diary Discussion	Diary Discussion
Memory Goal Selection	Memory Systems & Processes	Normal & Pathological Memory Changes	Contextual Determinants of Memory I	Contextual Determinants of Memory II	Review of Course Material
Strategy training	Strategy training	Strategy training	Strategy training	Strategy training	Strategy training

Note: Sessions were held at a weekly basis and each session was of 90 minute duration.

Assessment

A memory test battery was administrated before and after the intervention, and again at a three-month follow-up (see Table 8.2 for an overview of the assessment procedure). All assessments were conducted by the lead author (GS) student and were of approximately one hour duration.

Outcome measures

Objective memory

Rivermead Behavioural Memory Test – Extended Version (RBMT-E; deWall, Wilson, & Baddeley, 1994). The RBMT-E consists of 12 subtests, each of which was designed to assess a different aspects of everyday memory tasks such as remembering names associated with faces, recalling a short story, remembering a route, remembering to ask for a hidden belonging and recalling its location, remembering to deliver a message and recognising a series of faces. The RBMT-E reliably distinguishes between performance of healthy middle-aged and elderly populations and has sufficient sensitivity to detect the small age-related differences in everyday memory performance between these groups that result from ageing (deWall, Wilson, & Baddeley, 1994).

Subjective memory

Self-rated memory performance and associated worries were examined by a number of questions: "How would you describe your memory performance?" (*1 = Poor/bad, 7 = Excellent*). "How worried are you about your current memory performance?" (*1 = Not worried at all; 7 = Very worried*). "How worried are you about your future memory performance?" (*1 = Not worried at all; 7 = Very worried*). In addition to this, clients were also ask to choose personal memory goals and to rate the goal attainment status (*1 = Goal not attained; 7 = Goal attained*) at each assessment.

Everyday memory strategy usage

Memory Compensation Questionnaire (MCQ; Dixon, et al., 2001). The 34-item MCQ assesses individual's usage of everyday memory strategies and includes five sub-scales: External (i.e., usage of notes and calendars); Internal (i.e., mnemonic strategies); Time (i.e., investing more time to succeed in memory tasks); Effort (i.e., increasing levels of concentration), and Reliance (i.e., relying on other people to remind oneself). A four-point Likert-type response format (*never, sometimes, often, always*) was used for the MCQ. Total scale scores ranges from 0 to 136. Previous research with the MCQ suggests acceptable levels of internal reliability (Dixon, et al. 2001), and construct validity (de Frias & Dixon, 2005).

Memory ability and controllability beliefs

Memory Controllability Inventory (MCI; Lachman, Bandura, Weaver, & Elliott, 1995). The 12-item MCI assesses beliefs about memory ability and controllability. The MCI is comprised of four sub-scales (Present Ability; Potential for Improvement, Effort Utility, and Inevitable Decrement). A 4-point Likert-type scale was used as response format (e.g., *strongly disagree, disagree, agree, strongly agree*). Total scores can range from 12 to 48, and higher scores denote a more positive conception of one's memory capabilities (items where reverse scored where necessary). Previous research suggests that the MCI scores possess acceptable levels of internal reliability and construct validity (Lachman, et al., 1995).

Table 8.2: Treatment evaluation measures across testing phases

	Pre-test	Session 3	Session 6	Post-test	Follow-up
Goal Attainment	●	●	●	●	●
RBMT-E	●	-	-	●	●
MCI	●	-	-	●	●
MCQ	●	-	-	●	●
Subjective Memory	●	-	-	●	●
Worries about current memory	●	-	-	●	●
Worries about future memory	●	-	-	●	●
ACE-R	●	-	-	-	-

8.4 Results

Table 8.3 shows the means and standard deviations of all outcome measures across the three assessment phases. Mean scores indicate that all measures moved in the expected direction from pre-test to post-test and, apart from goal attainment status, and all measures showed further improvements at the three month follow-up. Visual inspection of Figure 8.1 indicates that these general trends were, with some exceptions on individual outcome measures, observed for all five participants.

Table 8.3: Means and standard deviations for all programme evaluation measures at pre-test, post-test and three months follow-up

	M (SD)		
	Pre-test	Post-test	Follow-up
1 Memory goal attainment status	19 (5.2)	35.2 (7.2)	31.6 (9.4)
2 Objective memory	26.2 (2.5)	31.4 (4.7)	35.6 (4.4)
3 Subjective memory	3.8 (.84)	5.0 (1.0)	5.2 (.84)
4 Worries about current memory	4.6 (1.1)	4.4 (1.8)	3.4 (1.5)
5 Worries about future memory	5.8 (.87)	5.0 (1.2)	3.2 (.45)
6 Memory controllability beliefs	32.2 (2.3)	34.0 (2.9)	34.8 (1.7)
7 Memory strategy use	88.2 (7.3)	93.4 (11.2)	98.8 (13.3)

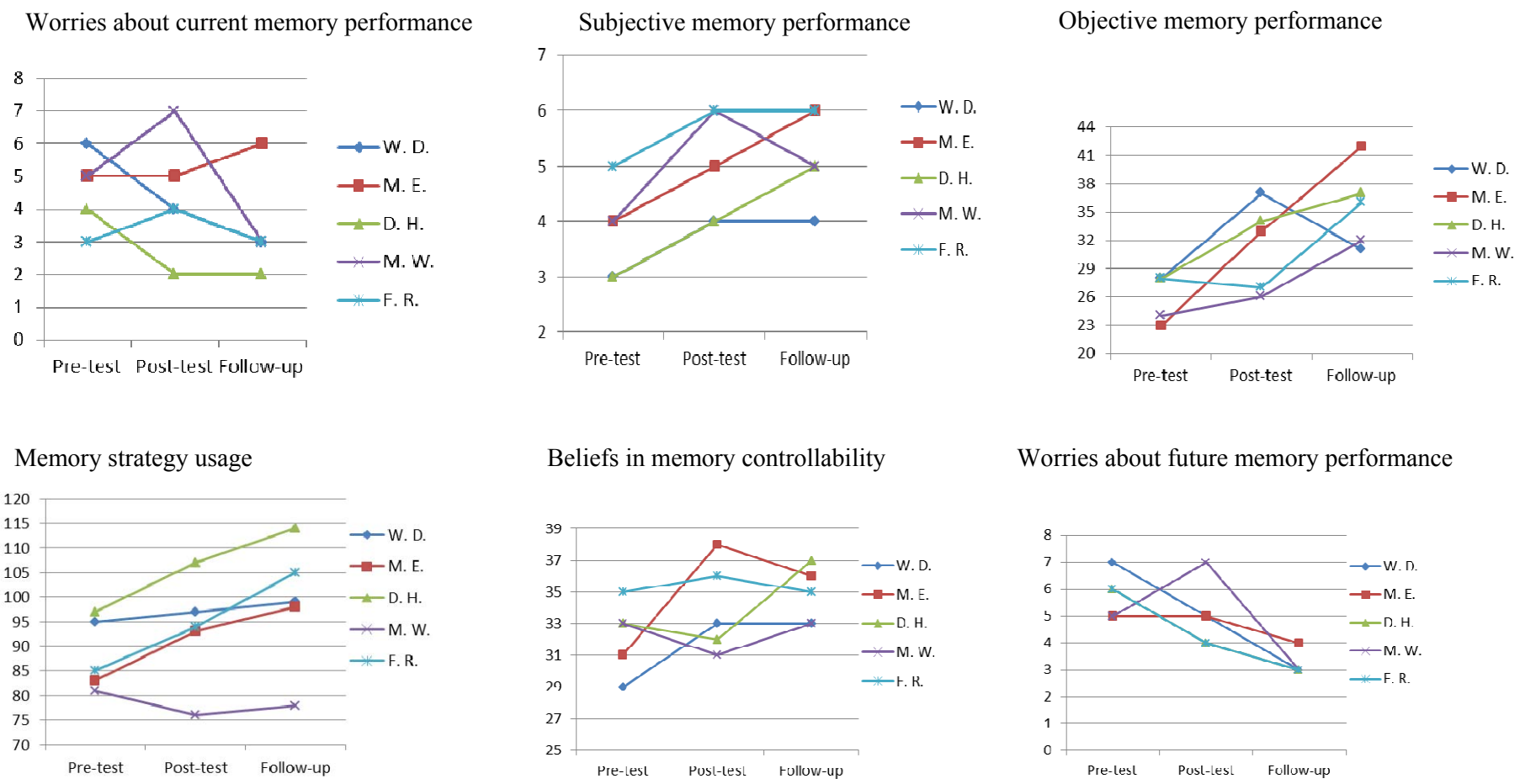

Figure 8.1: Trajectory of outcome measure scores across pre-test, post-test and follow-up assessments for each individual participant
Note: Worries about current memory performance (*1 = Not worried at all; 7 = Very worried*); Subjective memory performance (*1 = Poor/bad, 7 = Excellent*); Objective memory performan (*RMBT-E: 0-18 = impaired memory, 19-27 = poor memory, 28-36 = average memory, 37-42 = good memory, 43-48 exceptional memory)*; Memory strategy usage (*MCQ: 0 = never use strategies to 176 = always use strategies)*; Beliefs in memory controllability (*MCI: 12 = no confidence in memory ability and controllability to 48 = confidence in memory ability and controllability);* Worries about current memory performance (*1 = Not worried at all; 7 = Very worried*).

Evaluations of individual's memory goals and attainment statuses across pre-test, post-test and follow-up assessments

At the outset of the programme, each participant chose personal memory goals[12] that they hoped to achieve through the intervention. Goal attainment status for each individual memory goal was measured at pre-test, post-test and follow-up assessment[13] (i.e., *1 = Goal not attained; 7 = Goal attained*) as well as on two occasions during the treatment phase for goal reiteration purposes. Overall goal attainment scores were calculated for the pre-test, post-test and follow-up assessment phases. The data indicated that each participant made considerable progress in the effort to obtain their personal memory goals:

Case 1: W. D. selected seven personal memory goals including improving memory for 1) work priorities and tasks, 2) social and family activities, 3) names, 4) shopping lists, 5) household chores, 6) things to do in the immediate future, and 7) words and phrases. Her combined goal attainment scores (i.e., *T1= 21, T2 = 34, T3 = 33*) improved considerably at post-test and remained relatively stable at follow-up assessment.

Case 2: M. E. selected five personal memory goals including improving memory for 1) appointments, 2) names, 3) verbal instructions, 4) things to do, and 5) events in the distant past. Her combined goal attainment scores (i.e., *T1= 10, T2 = 22, T3 = 20*) improved considerably at post-test and remained relatively stable at follow-up assessment.

Case 3: D. H. selected eight personal memory goals including 1) improving her ability to recall conversations, 2) remembering why she went somewhere (in her house), 3) remembering the whereabouts of items, 4) remembering whether she has switched off appliances, 5) things to do, 6) remembering what she was going to say, and 6) improving her ability to pay attention. Her combined goal attainment scores (i.e., *T1= 23, T2 = 37, T3 = 41*) improved considerably at post-test and slightly increased at follow-up assessment.

Case 4: M. W. selected seven personal memory goals including 1) improving attention capacity, 2) improving recall for conversations, 3) remembering the whereabouts of items, 4) remembering names, 5) remembering appointments, 6) improving retention for what was read, and 7) reducing word finding difficulties. Her combined goal attainment scores (i.e., *T1= 22, T2 = 38, T3 = 44*) improved considerably at post-test and improved further at follow-up assessment.

Case 5: F. R. selected five personal memory goals including 1) remembering whereabouts of items short-term (i.e., keys) and long-term (passport), 2) improving memory

[12] Appendix A.7
[13] Appendix A.8

for people and place names, 3) improving memory for conversations, 4) improving ability to learn new names, and 5) remembering tasks at hand after distractions. Her combined goal attainment scores (i.e., *T1= 19, T2 = 40, T3 = 38*) improved considerably at post-test and remained relatively stable at follow-up.

8.5 Discussion

Psychologists have developed a considerable range of memory interventions for older people with or without significant cognitive impairment and individuals with recognised neurological conditions such as acquired brain injury. Despite research evidence showing that normally ageing, middle-aged individuals worry considerably about their ageing-related memory decline, the midlife cohort is generally excluded from memory intervention research and practice. The aim of this study was to examine the short- and long-term effectiveness of a clinically developed memory intervention that was specifically designed for the normally ageing midlife cohort.

The programme evaluated here was offered as a service by a university psychology clinic. It was the researcher's intention to conduct a larger scale study that would permit statistical analyses of the data. Given what is known about midlife memory, it was expected that the public's interest in this group intervention would be considerably higher. However, despite extensive efforts to advertise the programme over an 8 week period, interest in the programme was extremely low. Over 400 professionally designed flyers and 20 posters were distributed in the Wellington city area. Flyers were available at libraries, doctor surgeries, psychology clinics, cafes, community centres, supermarkets, a public lecture on memory and ageing, a bridge club, a church, and a university gym. All up, only twelve people enquired about the programme and of these, five individuals decided to enrol. Certainly, for many people, the programme would have been unaffordable due to the 186 NZ $ charge. Nonetheless, for many others, paying the charge would not have been off-putting – 9 hours of professional treatment are usually considerably more expensive than what was charged for the programme evaluated here.

Why else could the interest in the programme have been that low? It may be that, for some, it was not the *amount* of money but rather an unpreparedness to pay *any* money for memory improvement. Surely, most of us would have paid a dentist, doctor, optometrist, or psychologist much more money for much less of his/her time and effort without even questioning it. Thus, it may be that memory improvement is not something that people are prepared to pay for, even if the price is relatively low.

Another factor that may have discouraged some middle-aged people to enrol could be that they did not consider themselves to be middle-aged. The advertisements clearly delineated the age-band (i.e., 40-65 yrs.) of potential applicants and defined this period of life as midlife. Even though a person may have been within that age-range, and may have had interest in the intervention, she could consider herself young or old rather than middle-aged and thus did not avail of the offer. Even scientists cannot agree on what should constitute midlife (i.e., ranging from 20 to 40 years between authors) so not everybody reading the advert might have agreed with the advertised definition of midlife.

Five middle-aged women took part in this pilot study and visual inspections of data indicate that the programme has merits for midlife memory improvement. Group mean scores for all outcome measures indicated improvements at post-test assessment. Except from goal attainment scores all outcome measures improved again at follow-up assessment. These trajectories were also true for most participants when their scores are considered on an individual basis.

Previous research showed that memory and ageing education, as well as memory strategy training are effective treatments that improve subjective and objective memory performances (Verhaeghen, et al., 1992; Floyd, & Scogin, 1997; Metternich, et al., 2010). Education and strategy training were two of the core components of the Midlife Memory Programme and the trends in the current data seem to suggest that they have been effective in the current research. Memory goal selection and pursuit was the third core component of the programme evaluated here. The current data suggest that personal everyday memory goals may have similar effects on everyday memory as those that were observed for the memory goal/performance relationship in the laboratory (e.g., Stadtlander & Coyne, 1990; West, Welch & Thorn, 2001; West, Thorn, & Bagwell, 2003; West, Bagwell, & Dark-Freudeman, 2005). Specifically, the data indicated that all participants made considerable progress in their efforts to reach the personal memory goals that they had set for themselves at the outset of the programme. These findings are in line with recent research that examined the effects of memory goals on memory strategy usage in everyday life. Findings from an online survey indicated that those who rate common memory goals as more important use memory strategies more frequently in everyday life (Scheibner & Leathem, 2011). Arguably, individuals who participate in memory programmes are less likely to expend large amounts of effort in learning complicated memory strategies, if they do not see how the training may be of use in their everyday life (Camp, 1998). Thus, the face validity of memory programmes increases if specific strategies are linked to individuals' personal everyday memory goals as it

was done in the Midlife Memory Programme. However, the use of structured memory goal setting and pursuit has, to our best knowledge, not been incorporated into memory intervention research or practice and further research is needed in this area.

The fourth core component of the programme involved the facilitation of group discussions about client's everyday memory experiences. Group discussions with same-age peers have previously been recognised as beneficial as individual's comprehension of material to be learned and motivation increases (e.g., Chene, 1994; Clough, 1992; Millis, Davidson, & Cottell, 1994). Our own observations, as facilitators of the programme presented here, suggest that the group discussion had a considerable positive impact on individual's overall memory experience. Specifically, it appeared that formally discussing each other's memory failures normalised individual's *personal* experiences with forgetfulness and the group discussions may therefore have contributed to the observed reduction worries about current and future memory performance.

Limitations

This pilot study used a multiple case study, before/after design. A number of limitations need to be considered carefully when the results are interpreted. Although improvements were observed for all participants on most outcome measures, the lack of a control group does not permit us to conclude with certainty that the observed improvements were due to the effects of the intervention programme presented here. Thus, while this study indicates that the programme has merits, a larger scale study with a waiting list control, or comparison treatment group, is needed to formally establish the programme's efficacy and effectiveness. Similarly, our interpretations of the outcomes were solely based on visual inspections of the data as the small sample size and nature of the research design did not permit statistical analysis of the data.

The Midlife Memory Programme was evaluated as a package and thus, the research design used, did not permit an evaluation of the relative contribution of individual treatment modules. Previous research has validated memory and ageing education, memory strategy training, and group discussions as efficacious treatment modules with clinical populations and the current data seems to be in line with this. For the current programme a novel treatment component - goal selection and pursuit - was used and the contribution of this module on the observed effects remains unclear until a larger controlled study is conducted.

It must also be stressed that all participants were educated at university level and it may be that individuals with higher levels of formal education are more likely to benefit from a classroom-based intervention than those with less formal education.

In conclusion, the memory programme presented here makes an important contribution to the literature on memory interventions as it is the first memory intervention that was specific designed for normally ageing middle-aged individuals. Although the data are encourageing, a larger scale study is needed to establish the efficacy of the programme.

CHAPTER IX
GENERAL CONCLUSIONS AND DISCUSSIONS

It is well known that significant objective memory decline begins within the developmental stage of midlife (Larrabee, et al., 1988; Schaie, 1996; West & Crook, 1990), and research suggests that subjective memory impairment is also substantial (Ponds et al., 1997). Despite the high levels of forgetfulness among the middle-aged, a review of the research literature suggested that multifactorial memory programmes have thus far only been evaluated with people above the age of 65 years or younger cohorts such as college students (Yesavage, 1983, 1984; Yesavage, et al., 1982; Lachman, et al., 1987; Lachman, et al., 1992; McDougall, 1999, 2002; McDougall, et al., 2006) while middle-aged individuals have largely been excluded from memory intervention research. These findings provided the rationale for this thesis. The following sections summarise the findings and limitations of the research studies and offer some suggestions for further research.

9.1 Core findings and implications of this research

9.1.1. The Survey

The first part of the research was survey-based, with 409 adult New Zealanders participating in an online-survey. The aim of survey was to answer a number of questions in relation to both theoretical as well as practical aspects of everyday memory. The theory of Selective Optimisation with Compensation (SOC) was chosen as the theoretical background to explore this. The existing literature had shown that the SOC framework has been applied to a large range of topics within the domain of developmental psychology but had not been evaluated within the context of memory and memory-related variables such as memory compensation efforts and individuals sense of memory controllability. Given that age, education, health, and mood have previously been identified as strong predictors of cognitive development, the analyses of the survey data statistically controlled for these factors. Two separate research papers were written.

In the current thesis, the SOC model was examined in the context of everyday cognitive failures and efforts to compensate for forgetfulness. Attention was also given to the moderating effects that mood may have on the SOC/forgetfulness relationship and whether SOC endorsement influences individual's efforts to compensate for memory failures (i.e.,

Chapter 6). In addition, analyses also focused on the mediating effects that SOC endorsement may have on the memory control beliefs/forgetfulness relationship (i.e., Chapter 7). The following sections discuss the core findings and implications of this research with respect to the theory of Selective Optimisation with compensation.

Cognitive failures and SOC

The survey results suggested that SOC strategy endorsement had clear benefits for cognitive functioning. When the overall SOC score was used to determine the effects of SOC on the experience of cognitive failures, SOC endorsement accounted for a reduction in each of the CFQ's facets of cognitive failures (i.e., accounting for a reduction in forgetfulness, distractibility, and false triggering). When individual SOC strategy were regressed on the CFQ-Forgetfulness scale, it was shown that only optimisation efforts accounted for a reduction in forgetfulness while selection and compensation efforts did not affect individuals levels of forgetfulness. These findings are consistent with the general findings that SOC endorsement accounts for more positive developmental outcomes. As shown in Chapters 6 and 7, previous SOC studies have considered a variety of topics and the present finings expand on these findings by considering deficits in everyday cognitive functioning within the SOC framework.

Mood and SOC

A meta-analytic review on the association between depressed mood and memory impairment by Byrd Burt, et al. (1995) has shown a stable positive relationship between the two variables. Previous research had also shown that for individuals with depressive disorders, SOC strategy scores vary in accordance with the severity of depression symptoms (Weiland, et al., 2011). Given the high prevalence of depressive disorders in the general population, mood was considered to be a significant covariate in the analysis of this thesis. The analyses presented in Chapter 6 suggested that mood attenuated the beneficial effects that SOC strategies had on the occurrence of cognitive failures. The current research therefore suggests that the mood-effect on SOC strategy endorsement as well as effectiveness seems to be a critical variable to be considered in future research that applies the SOC framework. It is important to keep in mind that the sampling procedure may have resulted in the relatively low levels of variation in mood scores, and that a more representative sample in terms of self-reported mood may have shown an even stronger mood-state effect on SOC endorsement and effectiveness.

Memory compensation efforts and SOC

The present research suggested that SOC endorsement was correlated to memory compensation efforts. However, the magnitude of this association was small and SOC endorsement was not found to moderate the effectiveness of memory compensation efforts as it was hypothesised. These findings were unexpected as the memory compensation efforts measured by the MCQ should reflect memory-specific optimisation and compensation efforts as defined by the SOC model. As it has been suggested by previous research (e.g., Wiese, et al., 2000) it may be that the effects of SOC strategy endorsement is best measured with domain-specific SOC scales as such scales have been shown to have higher predictive power For example, recent research has used work-, family-, partnership-, and exercise-specific SOC questionnaires that accounted for much of the variation in criterion variables (i.e., Young, Baltes, & Pratt, 2007; Ziegelmann & Lippke, 2007; Wiese et al., 2000). Thus, despite a correlation of small magnitude, no interactions between SOC and memory compensation efforts were observed and it may be that the utility of the domain-general SOC scale is somewhat limited when analyses relate to specific areas of functioning such as memory compensation efforts.

Memory control beliefs and SOC

Part of the survey focused on the mediating effects that SOC may have on the memory control belief/forgetfulness relationship. The analyses showed that memory control beliefs accounted for 22% of the variance in self-reported forgetfulness. Subsequent analyses showed that only optimisation, but not selection or compensation, partially mediated the beneficial effects that memory beliefs have on forgetfulness. Thus, the hypothesis that SOC mediates the beneficial effects of memory control beliefs was only partially supported.

It may be that the lower utility of the domain-general SOC scale had attenuated the predicted effect and that a memory-specific scale could have resulted in a stronger mediation effect. However, the fact that optimisation was the *only* significant mediator of the control belief/forgetfulness relationship may also be due to the age distribution of the sample (i.e., 73.5% of participants were middle-aged). According to the assumptions of the SOC model, resources are differentially allocated to the goals associated with growth (elective selection), maintenance (optimisation), and regulation of loss (loss-based selection and compensation) depending on age or developmental stages (Baltes, 1997). Specifically, early in life most resources are allocated to functions of selection. The use of resources for optimisation is most characteristic in young adulthood and midlife and older age has been shown to be most

associated with higher levels of demand in resources for both optimisation and compensation (Ebner, et al., 2006). The current data was in line with these findings as the predominantly middle-aged participants favoured optimisation strategies over selection and compensation efforts (i.e., elective selection: $M = 2.29$; loss-based selection: $M = 3.59$; optimisation: $M = 6.22$; compensation: $M = 4.00$). Thus, the findings in relation to SOC and control beliefs are consistent with the differential allocation to goals as proposed by Baltes (1997).

9.1.2 The Midlife Memory Programme

The Midlife Memory Programme was evaluated on the basis of a before/after, multiple case study design ($N = 5$) with a three month follow-up memory assessment. Four treatment components including: 1) Memory and ageing education; 2) Memory goal selection and pursuit; 3) Memory strategy training; and 4) Group discussions about everyday memory experiences, were employed. The development of the treatment was guided by previous research on memory interventions for healthy elderly individuals. Each individual intervention module will be discussed below.

Memory and ageing education

The educational aspect of the programme was specifically designed to be relevant for the midlife cohort. Previous research indicated that forgetful people favour education as an intervention for memory difficulties (i.e., Commissaries, et al., 1998) and education has been identified as a method that reduces worries associated with everyday memory complaints (Mol, et al., 2006). The programme presented in this thesis focused on memory change and stability that occurs during midlife and clients were also informed about the difference between ageing-related forgetfulness and pathological memory disorders. In addition, clients learned about the memory system and memory processes that facilitate encoding, memory, and recall. It is difficult to determine to what degree the educational aspect of the programme contributed to memory improvement for this midlife cohort. However, given the previously identified efficacy of the education modules (e.g., Cavanaugh & Poon, 1989; Floyd & Scogin, 1997; Turner & Pinkston, 1993; Troyer, 2001) it is likely that education may have contributed to the success of the Midlife Memory Programme.

Memory goal setting and pursuit

A second module of the Midlife Memory Programme was memory goal selection and pursuit. Setting memory goals and striving to attain them had been shown to improve memory performance and memory self-efficacy in the laboratory (Stadtlander & Coyne, 1990, West & Thorn, 2001; West, et al., 2003, 2005). Despite these findings, the current literature suggests that memory goal selection and pursuit has thus far not been incorporated into memory enhancement programmes. The programme presented in this thesis indicated that clients made significant progress towards reaching their idiosyncratic memory goals and it may be that goal setting had increased motivation, attention, and goal-directed behaviour as suggested by previous research (Bandura, 1989; Locke & Latham, 2002; Schunk, 1991). The findings of this thesis suggest that personal memory goal setting and pursuit may be a promising module for future memory programmes. When the Midlife Memory Programme was conducted, it was noted that the memory goal module was conducted with relative ease and compared to other aspects of the programme the module required only modest time investment. It has long been argued that memory enhancement programmes lack ecological validity (e.g., Camp, 1998). It was noted by the facilitators of the Midlife Memory Programme that personal memory goal pursuit had provided clients with a sense that the overall intervention mattered for their idiosyncratic memory complaints. Thus ecological validity of memory enhancement programmes may be improved when personal goal pursuit is encouraged as part of a memory intervention. Memory goal pursuit seemed to have been effective for the middle-aged clients of the programme presented here and it is likely that older adults may also benefit from personal memory goal pursuit.

Memory strategy training

The effects of memory strategy training has been extensively researched and the majority of memory enhancement programmes have found this intervention to be effective (Verhaeghen, et al., 1992; Floyd & Scogin, 1997; Metternich, et al., 2010). As suggested by previous research (i.e., Dixon, et al, 2001; Intons-Peterson & Fournier, 1986), the clients of the Midlife Memory Programme reported that external memory strategies were employed more frequently than internal strategies. As discussed in Chapter 4, time investment and mental effort is usually much higher for internal strategies. Going through the trouble of applying an internal strategy (i.e., pegwords) to remember a shopping list rather than writing it down on a piece of paper would not make much sense. Nonetheless, for some of the memory goals that individual clients had, internal strategies were actively encouraged as

external strategies would have not been suitable. For example, D.H. had difficulties in remembering why she went somewhere in her house in her daily life as a homemaker. External strategies would have been cumbersome for this type of memory failure while internal memory strategies (visualisation, retracing, increasing attention, etc) reduced her memory failures in this domain. Thus, the most traditional module of memory enhancement, the teaching of mnemonic techniques had been useful for the clients of the programme presented here.

Peer-group discussions

The final module that was employed in the Midlife Memory Programme was the facilitation of group discussions on everyday memory experiences. Comprehensive memory training programmes that include group discussions have been shown to obtain higher training gains than programmes without them (Verhaeghen et al., 1992). For the purposes of the Midlife Memory Programme each client wrote a memory diary to facilitate recall of the circumstances that may have led to specific instances of forgetfulness. It had been suggested that the sharing of such personal experiences makes learning more meaningful and that the effectiveness of strategies may be "advertised" by peers, who report successful application of a particular technique (West, et al., 2000).

Despite initial reservations that the clients of the Midlife Memory Programme may not want to share their personal memory failures, the group discussion module appeared to be a particularity enjoyable aspect of the programme for participants as well as facilitators. It was noted that few clients actually used the memory diary to record instances of forgetting. Nonetheless, each of the clients was able and willing to share memory failures and the contexts in which they occurred. These accounts were often amusing and resulted in pleasurable entertainment for the entire group. In addition, client's self-reports were setting the stage for the remainder of each session. Real-life instances of forgetting were used as examples to explain different aspects of memory systems and processes as well as specific memory strategies.

Thus, as for research with older individual (i.e., Verhaeghen et al., 1992; Caprio-Prevette & Fry, 1996), peer-group discussions seemed to have a positive effect on middle-aged client's overall memory experience. The value of group discussions about *personal* memory failures with respect to memory education and memory strategy training has thus far not been discussed in the memory enhancement literature. The current research suggest that discussing personal memory failures facilitated a) a more personalised understanding of the

educational aspect of the programme, and b) a better understanding of the effectiveness and ecological validity that a particular strategy may have for individual clients.

9.2 Limitations

9.2.1 The survey

Surveys are a primary research method within the social sciences and the literature has discussed a range of noteworthy limitations that apply to survey-based research including the research presented in this thesis. Self-reports may be strongly affected by the nature of the psychometric scales used in survey research (Schwarz, 1999). Two noteworthy limitations of survey research, that also apply to the survey-based research in this thesis, include limitations in relation to the format of the question (i.e., open vs. closed questions), and the format of the response options. The questions ask in the context of the survey presented in this thesis were of closed response format. Research has shown that, depending on whether the question had an open or closed questioning format individuals may provide profoundly different answers to essentially the same question. A study by Schuman and Presser (1981, pp. 105-107) illustrates this effect. They had asked parents what they consider "the most important thing for children to prepare them for life". In the closed question format, 61.5% of respondents picked "To think for themselves" when this response option was among the possible responses. When the question was asked with an open response format, only 4.6% of respondents provided a response that would reflect a similar ideal for children's upbringing.

The closed question format used in the current thesis may have had similar effects. For example, the 25 possible instances of cognitive failures measured by the CFQ do not represent the entire range of a virtually infinite number of possible cognitive failures that individuals may experience. Thus, respondents were not given the opportunity to report on the frequency of other cognitive failures (e.g., forgetting to season the soup or forgetting an important anniversary). Similarly, there are unquestionably more memory strategies than those assessed by the MCQ and the present data does not account for usage of a large range of other possible memory strategies (e.g., putting an empty milk bottle on the table to remind oneself to buy milk). Thus, the conclusions of the present research are limited to a range of '*common*' memory phenomena but may not account for a much larger range of idiosyncratic experiences and behaviours which would have required the use of an open question format.

The nature of the response options offered to participants is also associated with limitations. The length of the reference period may have confounded participant's responses.

Considering the retrospective nature of most questions ask (e.g., CFQ: *How often have you experienced the following situations within the last six months?*), it is likely that the occurrence of some cognitive failures of interest that occurred were not considered by the participant due to the fact that it was not recalled. In addition, participants also had to infer what exactly is meant by the specific response options offered (i.e., CFQ: *never, sometimes, often, always*). Participant A may assign the descriptor of *'sometimes'* to 25 instances of forgetting within a 6 month period while participant B assign *'often'* to only 10 instances in the same time period.

The limitations outlined above are common to most survey studies including the present survey-based research. In addition to these limitations, the current survey had an additional limitation to the generalisability of the findings. As discussed in Chapter 6 and 7, the participants reported extremely high levels of education with over 70% of the 409 participants reporting university education. In contrast, the New Zealand census data indicates that only 40% of New Zealanders engage in post-school education (SNZ, 1996b). As it has been discussed throughout this thesis, the literature had shown that education is associated with most of the variables of interest to this research. Thus, a more representative sample in terms of education would have increased generalisability of the findings.

The most likely reason for the high levels of education among the sample is related to the recruitment techniques. Due to technicalities of the online survey, it was not possible to determine which advertisement method (e.g., university email list; Facebook advert; or newspaper advert) contributed most to the extending data file during and after the data collection process. It seems likely that the university email list was the most successful recruitment method, resulting in an over-representation of highly educated individuals among the participants. As discussed in Chapter 6, high levels of education may also have the reason for low levels of variability in mood-ratings (i.e., the majority of participants reported good or excellent mood) further compromising the generalisability of the findings.

It must also be stressed that the mood measure was a single-item measure which may have compromised the psychometric validity of the mood-ratings. The item required participants to answer the following question: 'please indicate how your mood has generally been within the last six months'. The response option was a Likert-type scale with four qualitative descriptors (i.e., excellent, good, fair, poor/bad). In the initial planning stages of the research it was intended to include a more comprehensive and well-validated mood scale (i.e., the Centre of Epidemiologic Studies Depression Scale). However, it was decided against this as the surveys core measures (i.e., Cognitive Failure Questionnaire, Memory

Compensation Questionnaire, Memory Controllability Inventory, and the SOC questionnaire) were of considerable length and research has indicated that excessive survey length may negatively impact on response rates in that longer surveys have far lower response rates (e.g., Sheehan, 2006). Thus, in order to keep the survey completion time at an acceptable length, mood-ratings were measured with a single-item scale only. In hindsight, since so many people did complete the questionnaire, the addition of a more robust measure of depression may have been worthwhile.

9.2.2 The Midlife Memory Programme

In the planning stages of the research that examined the efficacy of the Midlife Memory Programme the intention was to recruit at least 30 participants as statistical power estimations indicated that this number of participants was needed to conduct meaningful and valid statistical data analyses. The original research plan therefore required that four to five groups (i.e., 7-9 individuals in each) would be conducted to evaluate the programme's effectiveness. Despite extensive efforts to advertise the programme over a period of two months, it became apparent that the goal of recruiting the desired minimum of 30 participants was unlikely to be achieved given the time-frame and the budget that was available. As discussed in Chapter 8, over 400 professionally designed flyers and 20 posters were circulated locally, but despite this, only twelve individuals made enquiries about the programme of which five individuals decided to enrol. Thus, given time and budget constraints and the fact that the programme was advertised to be conducted within the months of September to November 2010, the plan was changed to running the group with only the five participants who had already enrolled.

Given the small number of participants, the data did not permit a statistical approach to the process of hypothesis testing. Considerations were given to the possibility of using the Reliable Change Index (RCI) to determine whether individual participants improved as a result of the group intervention. However, normative and clinical data sets, as well as reliability indexes, were not consistently available for evaluation measures and thus RCIs could not be computed for the majority of outcome measures. Instead, the programme evaluation relied on visual inspection of both, group means and individuals scale scores. For these reasons the evaluation of the memory programme can only be considered a pilot study that does not allow for a high degree of certainty that the programme is efficacious.

A number of other limitations need to be considered carefully when the results are interpreted. Although improvements were observed for all participants on most outcome measures, the lack of a control group does not permit a conclusion about the programme's

effectiveness. Thus, while this thesis indicates that the programme has merits, a larger scale study with a waiting list control, or comparison treatment group, is needed to formally establish the programme's efficacy and effectiveness.

Given the research design, the Midlife Memory Programme was evaluated as a package and an evaluation of the relative contribution of each individual treatment modules was not possible. The programme included a novel treatment component. Individuals were encouraged to select memory goals and to make a conscious effort in attaining their goals. While pursuing memory goals seemed to have the desired effect (i.e., goals attainment scores improved), the contribution of this module on objective memory performance remains unclear until a larger controlled study is conducted that permits statistical analyses.

9.3 Conclusion

Middle-aged adults experience worries and inconvenience because of age-appropriate forgetfulness. Despite a range of arguments that point to the usefulness of cognitive enhancement in midlife, scientific attention to midlife memory improvement has been relatively low. The memory programme presented in this thesis contributes to the literature on memory interventions as it is the first multifactorial memory intervention programme that was specifically designed for middle-aged individuals. Although the data are encourageing, a larger scale study is needed to establish the efficacy of the programme. The survey-based research presented in this thesis also expanded on the existing literature by considered previously unexamined variables of cognitive functioning within the framework of the SOC perspective of the ageing process.

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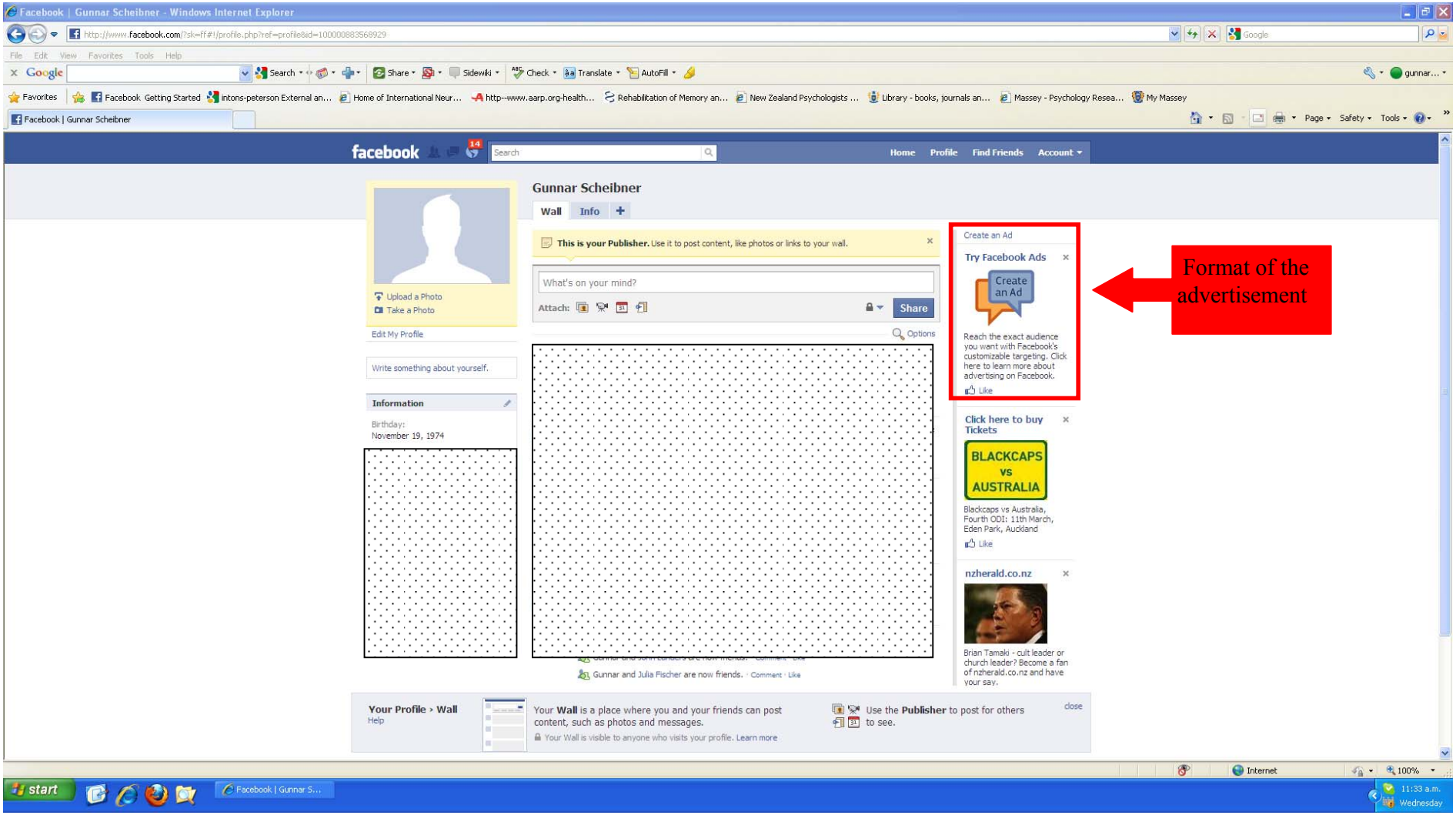
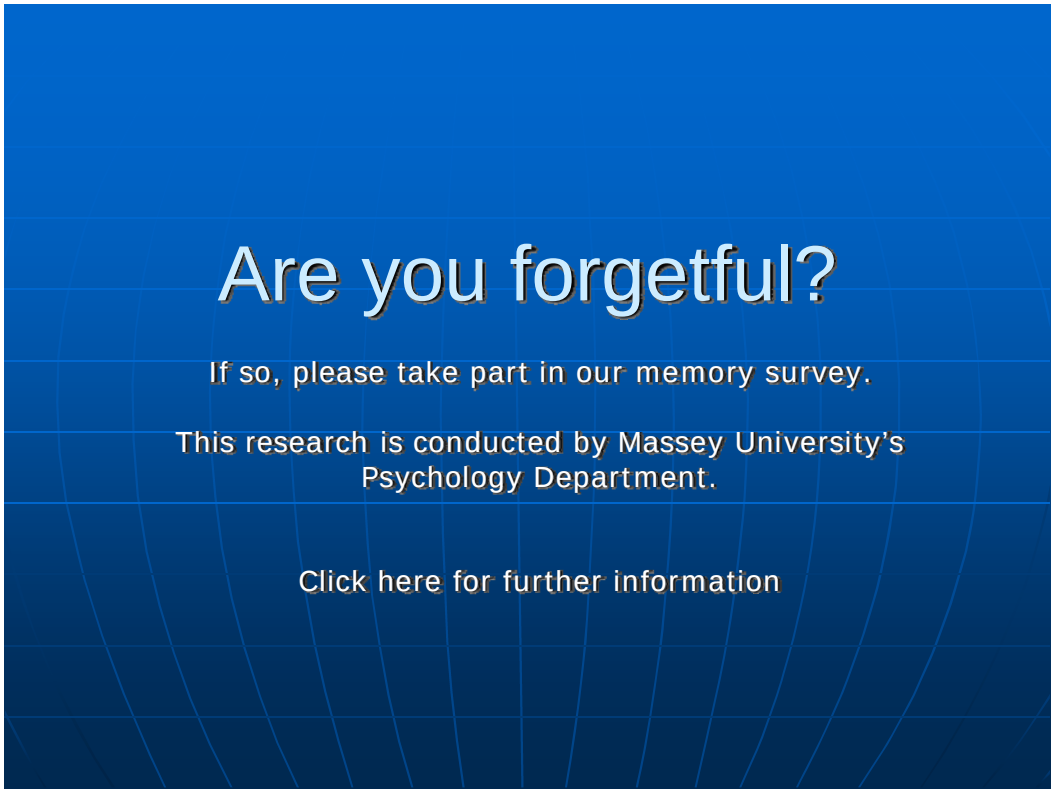
Appendices

Facebook advertisement format



Facebook advertisement content



Newspaper advertisement format and content

Memory Performance

INFORMATION SHEET

Who is doing this research?

My name is Gunnar Scheibner and I am a student at Massey University. I am currently conducting this research project as partial requirement of completing a Doctoral degree in Clinical Psychology. The primary supervisor for this project is Professor Janet Leathem of Massey University's Wellington campus.

What is this research about?

This project is based on survey data and aims to find out about what people think about their everyday memory performance. The findings of the current investigation are likely to benefit future research with the aim of reducing memory difficulties. You are invited to complete this survey, which will take approximately 15 to 20 minutes of your time.

Who can participate?

Potential participants are being recruited via newspaper, magazine, and internet advertisement. Anybody over 18 years of age is invited to participate. The aim is to recruit at least 55 individuals, as this number is needed in order to conduct a statistically valid and meaningful analysis.

Participation in this investigation may result in heightened awareness of everyday memory difficulties among participants. However, previous research has shown that more than three quarter of individuals over the age of 40 report having memory problems and thus, this high rate suggests that such memory difficulties are a normal part of the aging process. However, if you are worrying about your memory difficulties, you should contact your GP for advice.

Your rights as a participant:

You are under no obligation to accept this invitation. Completion and submission of the questionnaire implies consent. You are free to omit answers to any particular questions if you wish.

Data resulting from this investigation will be securely stored at Massey University. Participation in this investigation is anonymous and the data will be viewed only by the researcher, the primary supervisor, and the computer programmer/analyst of the psychology department of Massey University. All data will be stored for 5 years, after which it will be destroyed.

If you have any further questions please feel free to contact the researcher or supervisor. A detailed report outlining the findings of this research study will be available to all participants, on request, in December 2010.

Many Thanks,

Gunnar Scheibner

Researcher:	Supervisor:
Gunnar Scheibner	Professor Janet Leathem School of Psychology Wellington Campus Massey University New Zealand
Email: gunnar.scheibner@gmail.com	Telephone: 04 801 5799, Ext 62035 Email: J.M.Leathem@massey.ac.nz

Completion and submission of the following questionnaire implies your consent to participating in the research.

Please **click HERE** if you would like to continue and participate in this research.

This project has been reviewed and approved by the Massey University Human Ethics Committee: Southern B, Application 09/23.

If you have any concerns about the conduct of this research, please contact Dr Karl Pajo, Chair, Massey University Human Ethics Committee: Southern B, telephone 04 801 5799 x 6929, email humanethicsouthb@massey.ac.nz.

Memory Performance

All going well, you have been directed here from the preceding information sheet about this survey.

Instructions

Thank you for participating in this study. The questionnaire contains of a series of questions about you, your memory performance and strategies you may use to help remember things.

The questionnaire requires roughly 15 to 20 minutes of your time.

Your responses are anonymous and data will be held in a secure file with no linkage back to the respondent.

The findings of the current investigation are likely to benefit future research with the aim of reducing memory difficulties.. We appreciate your input.

Please complete all the sections below if possible. You have the right to decline to answer any particular question.

PLEASE NOTE:
If at any stage you would like to check your previous answers to any questions please scroll up and down the document.
Do not use the back-button on your tool bar, as this will take you out of this survey without saving your answers.

Many thanks for your assistance with this survey.

Section A - Participant Demographics

Please respond by choosing the options that best represent your situation.

1	What is your age (in years)?	[ ] years
2	What is your nationality?	[ ]
3	What is your ethnic background?	Please select one *If "Other", please specify* [ ]
4	What is your gender?	○ Male ○ Female
5	What is your marital status?	○ Married ○ Single
6	What is your employment status?	Please select one
7	Did you ever take part in a memory enhancing training programme?	○ Yes ○ No
8	What is your highest educational achievement?	○ Primary School ○ Secondary School ○ Third Level - Undergraduate

		○ Third Level - Postgraduate
9	Please indicate how your mood has generally been within the last 6 months.	○ Excellent ○ Good ○ Fair ○ Poor/Bad
10	Please indicate the quality of social support that is available to you.	○ Excellent ○ Good ○ Fair ○ Poor/Bad
11	For your age would you say, in general, your level of exercising behaviour is excellent, good, fair, poor or bad?	○ Excellent ○ Good ○ Fair ○ Poor/Bad
12	For your age would you say, in general, your health is excellent, good, fair, poor or bad?	○ Excellent ○ Good ○ Fair ○ Poor/Bad
13	Please indicate how your stress levels have been over the last six months.	○ Very Low ○ Low ○ High ○ Very High
14	Do you smoke? (If yes please indicate how many cigarettes per day.)	○ Yes - [ ] cigarettes per day ○ No

Section B - Goals

When you think about your memory, what important goals, if any, do you have for the future? By goals we mean that you may want to improve your memory for certain events such as birthdays or improve your memory for where you have left your keys etc.

In terms of your memory, please state up to six of your most important goals for the future:

15	
16	
17	
18	
19	
20	

Next, we will present you with a number of common goals people may have about their future memory performance. Please think about your own memory and indicate how important it is to you to accomplish these goals.

	How important is it...	Not at all Important	Somewhat Important	Important	Very Important
21	...to always remember whether I have turned off a light or a fire or locked the door?	○	○	○	○
22	...to always remember the turns on a road that I know well but rarely use?	○	○	○	○
23	...to always find the items I want in a supermarket?	○	○	○	○

24	...to always remember appointments?	○	○	○	○
25	...to always remember where I put things?	○	○	○	○
26	...to never throw away the things I want and keep what I meant to throw away?	○	○	○	○
27	...to always remember what items I want to buy when I am in a shop?	○	○	○	○
28	... that I learn people's names when I first meet them?	○	○	○	○
29	... to always remember the names of new acquaintances?	○	○	○	○

Section C - Memory Assessment

Think about your own memory – How strongly do you agree with the following?		Strongly Agree	Agree	Disagree	Strongly Disagree
30	I can remember the things I need to	○	○	○	○
31	I can't seem to figure out what to do to help me remember things	○	○	○	○
32	No matter how much I use my memory, it is bound to get worse as I get older	○	○	○	○
33	There's not much I can do to keep my memory from going downhill	○	○	○	○
34	If I work at it, I can improve my memory	○	○	○	○
35	I'm not good at remembering things	○	○	○	○
36	If I use my memory a lot, it will stay in shape, just like my muscles do if I exercise	○	○	○	○
37	I can find ways to improve my memory	○	○	○	○
38	I can't remember things, even if I want to	○	○	○	○
39	If I use my memory often, I won't lose it	○	○	○	○
40	I can think of strategies to help me keep up my memory	○	○	○	○
41	When it comes to memory, there is no way I can make up for the losses that come with age	○	○	○	○

How often have you experienced the following situations <u>within the last six months</u>?		Never	Sometimes	Often	Always
42	Read something and found you haven't been thinking about it?	○	○	○	○
43	Forgetting why you went from one part of the house to the other?	○	○	○	○
44	Failed to notice signposts on the road?	○	○	○	○
45	Confused right and left when given directions?	○	○	○	○
46	Bumped into people?	○	○	○	○
47	Forgotten whether you've turned off a light or a fire or locked the door?	○	○	○	○
48	Not listened to people's names?	○	○	○	○
49	Said something and realised afterwards that it might be taken as insulting?	○	○	○	○
50	Failed to hear people speaking to you when you are doing something else?	○	○	○	○

51	Lost your temper and regretted it?	○	○	○	○
52	Left letters unanswered for days?	○	○	○	○
53	Forgotten which way to turn on a road you know well but rarely use?	○	○	○	○
54	Not seen what you want in a supermarket?	○	○	○	○
How often have you experienced the following situations within the last six months?		Never	Sometimes	Often	Always
55	Wondered if you've used a word correctly?	○	○	○	○
56	Had trouble making up your mind?	○	○	○	○
57	Forgotten appointments?	○	○	○	○
58	Forgotten where you put something?	○	○	○	○
59	Thrown away the thing you want and keep what you meant to throw away?	○	○	○	○
60	Been daydreaming when you ought to be listening to something?	○	○	○	○
61	Forgotten people's names?	○	○	○	○
62	Started doing one thing at home and get distracted into doing something else?	○	○	○	○
63	Couldn't quite remember something although it's on the tip of your tongue?	○	○	○	○
64	Forgotten items to buy in a shop?	○	○	○	○
65	Dropped things?	○	○	○	○
66	Been unable to think of anything to say?	○	○	○	○

Section D - Strategies

	Thinking about your memory – how often does the following reflect your own behaviour?	Never	Sometimes	Often	Always
67	Do you use shopping lists when you go shopping?	○	○	○	○
68	Do you ask people to speak slowly when you want to remember what they are saying?	○	○	○	○
69	When you want to remember an important appointment do you ask somebody else (for example, spouse or friend) to remind you?	○	○	○	○
70	Do you put in a lot of effort when you want to remember an important conversation with a person?	○	○	○	○
71	When you want to remember a story, do you read it more than once?	○	○	○	○
72	When you are reading a book, do you use a bookmark to indicate where you stopped reading last time?	○	○	○	○
73	Do you put in effort when you want to memorise a funny story?	○	○	○	○
74	When you want to remember a newspaper article is it important to you to remember it perfectly?	○	○	○	○
75	When an interesting TV programme is going to be on in the next few days do you ask somebody else to help you remember (for example, spouse or friend)?	○	○	○	○

76	Do you concentrate a lot to learn something you really want to remember?	○	○	○	○
77	When you want to remember a newspaper article do you read it more slowly?	○	○	○	○

Thinking about your memory – how often does the following reflect your own behaviour?		Never	Sometimes	Often	Always
78	When you want to remember an event such as a birthday, do you ask somebody else (for example spouse or friend) to help you remember?	○	○	○	○
79	Do you post notes on a board or other prominent places to help you remember things for the future (for example, meetings or dates)?	○	○	○	○
80	When you want to remember the name of a particular person, do you ask somebody else (for example, spouse or friend) to help you remember?	○	○	○	○
81	When you are reading something that really interests you (and you want to remember) do you slow down your reading speed?	○	○	○	○
82	When you want to remember a conversation is it important to you to remember it perfectly?	○	○	○	○
83	Do you sometimes ask someone (for example, spouse or friend) to help you remember when you are going to start a trip?	○	○	○	○
84	Do you put things (for example, glasses or keys) in particular places to remember where they are for future purposes?	○	○	○	○
85	Do you try hard when you want to remember an important telephone number?	○	○	○	○
86	Do you put things in obvious places (for example, briefcase in front of the door) in order to remember them when going out?	○	○	○	○
87	When you want to remember something from a TV programme do you use "memory tricks" like grouping or repeating to yourself?	○	○	○	○

Thinking about your memory – how often does the following reflect your own behaviour?		Never	Sometimes	Often	Always
88	Do you take your time to go through and reconstruct an event you want to remember?	○	○	○	○
89	Do you write down appointments (for example, with the hairdresser or the dentist) in a notebook or calendar?	○	○	○	○
90	Before an important day do you think about or plan the things you have to do?	○	○	○	○
91	Do you spend a lot of time on "memory tricks" or other aids for memory in your daily life?	○	○	○	○
92	Do you note birthdays in a notebook or calendar in order to remember them?	○	○	○	○
93	Do you repeat telephone numbers to yourself in order to remember them well?	○	○	○	○
94	Do you write down telephone numbers in a calendar or notebook in order to remember them?	○	○	○	○
95	When you want to remember the name of a person do you try to associate the name with the person's face?	○	○	○	○
96	Do you concentrate when you want to learn the name of a person you have just met?	○	○	○	○

97	When you want to remember something that happened in a particular day do you review and reconstruct the events of that day in order to help you remember?	○	○	○	○

Thinking about your memory – how often does the following reflect your own behaviour?		Never	Sometimes	Often	Always
98	When you want to remember an event that took place when you were a child, is it important for you to remember it as perfectly as possible?	○	○	○	○
99	Do you use letters as cues (in other words, go through the alphabet) when you wan to remember the name of a person, a city or something else?	○	○	○	○
100	Do you put in effort when you want to remember the time of an important meeting?	○	○	○	○
101	When you want to remember something, do you try to relate something else you know well in order to remember it better?	○	○	○	○
102	If you want to remember a funny story, is it important to you to remember it perfectly	○	○	○	○
103	Do you use mental images or pictures to remember some of information?	○	○	○	○
104	Is it important to you to remember things perfectly (as verbatim as possible)?	○	○	○	○
105	Do you repeat important appointments to yourself in order remember them as well as possible?	○	○	○	○

Thinking about your memory – how often does the following reflect your own behaviour?		Much more	Little more	About same	Little less	Much less
106	Do you ask other people (for example, spouse or friends) to help you remember things more or less often today compared to 5-10 years ago?	○	○	○	○	○
107	Do you spend more or less time learning important things now compared to 5-10 years ago (for example, reading things more slowly or reading them more than once)?	○	○	○	○	○
108	Do you use aids for memory such as notebooks or putting things in certain places more or less often today compared to 5-10 years ago?	○	○	○	○	○
109	Do you put in effort and concentrate to remember important things more or less often today compared to 5-10 years ago?	○	○	○	○	○
110	Do you use memory tricks such as repeating things to yourself or grouping things in categories more or less often today compared to 5-10 years ago?	○	○	○	○	○

One more section to go!

Section E - What is Important?

We are also very interested in learning about how you decide which things in life are important for you and how you go about accomplishing what you want in life.

In the following, we present examples of two different ways people might behave.

Imagine there are two people talking about what they would do in a particular situation.
We would like you to decide which person is most similar to you - in other words, which one behaves most like the way you probably would.
Now, think about your life overall, including how things are going, think about your goals, that is, both things that you want to improve and things that you are satisfied with and want to maintain.

Once you have made your choices:
Please select the A/B choice on which person is most similar to you.
Please click on the numeric column choice to indicate the degree of similarity on a scale from1 to 4 (1= a little, to 4 = exactly).

A	B	1	2	3	4
Person A	*Person B*	*A little*	---	---	*Exactly*

	Person A	Person B	A	B	1	2	3	4
111	I concentrate all my energy on a few things.	I divide my energy among many things.	○	○	○	○	○	○
112	I always focus on the one most important goal at a given time.	I am always working on several goals at once.	○	○	○	○	○	○
113	When I think about what I want in life, I commit myself to one or two important goals.	Even when I really consider what I want in life, I wait and see what happens instead of committing myself to just one or two particular goals.	○	○	○	○	○	○
114	When things don't go as well as before, I choose one or two important goals.	When things don't go as well as before, I still try to keep all my goals.	○	○	○	○	○	○
115	When I can't do something important the way I did before, I look for a new goal.	When I can't do something important the way I did before, I distribute my time and energy among many other things.	○	○	○	○	○	○
116	When I can't do something as well as I used to, I think about what exactly is important to me.	When I can't do something as well as I used to, I wait and see what comes.	○	○	○	○	○	○
117	I keep working on what I have planned until I succeed.	When I do not succeed right away at what I want to do, I don't try any other possibilities for long.	○	○	○	○	○	○
118	I make every effort to achieve a given goal.	I prefer to wait for a while and see if things will work out by themselves.	○	○	○	○	○	○
119	When something matters to me, I devote myself fully and completely to it.	Even when something matters to me I still have a hard time devoting myself fully and completely to it.	○	○	○	○	○	○
120	When things don't go as well as they used to, I keep trying other ways of doing it until I can achieve the same result I used to.	When things don't go as well as they used to, I accept it.	○	○	○	○	○	○
121	When something in my life isn't working as well as it used to, I ask others for advice or help.	When something in my life isn't working as well as it used to, I decide what to do about it myself, without involving other people.	○	○	○	○	○	○
122	When it becomes harder for me to get the same results, I keep trying harder until I can do it as well as before.	When it becomes harder for me to get the same results as I used to, it is time to let go of that expectation.	○	○	○	○	○	○

To submit your results, please click on the ***Submit this information*** button.

If you wish to wipe your answers, click on the ***Clear your answers*** button.
With submission of your answers, you imply consent to participate in this study.

Submit this information. Clear your answers.

Thank you for your time in completing this questionnaire!

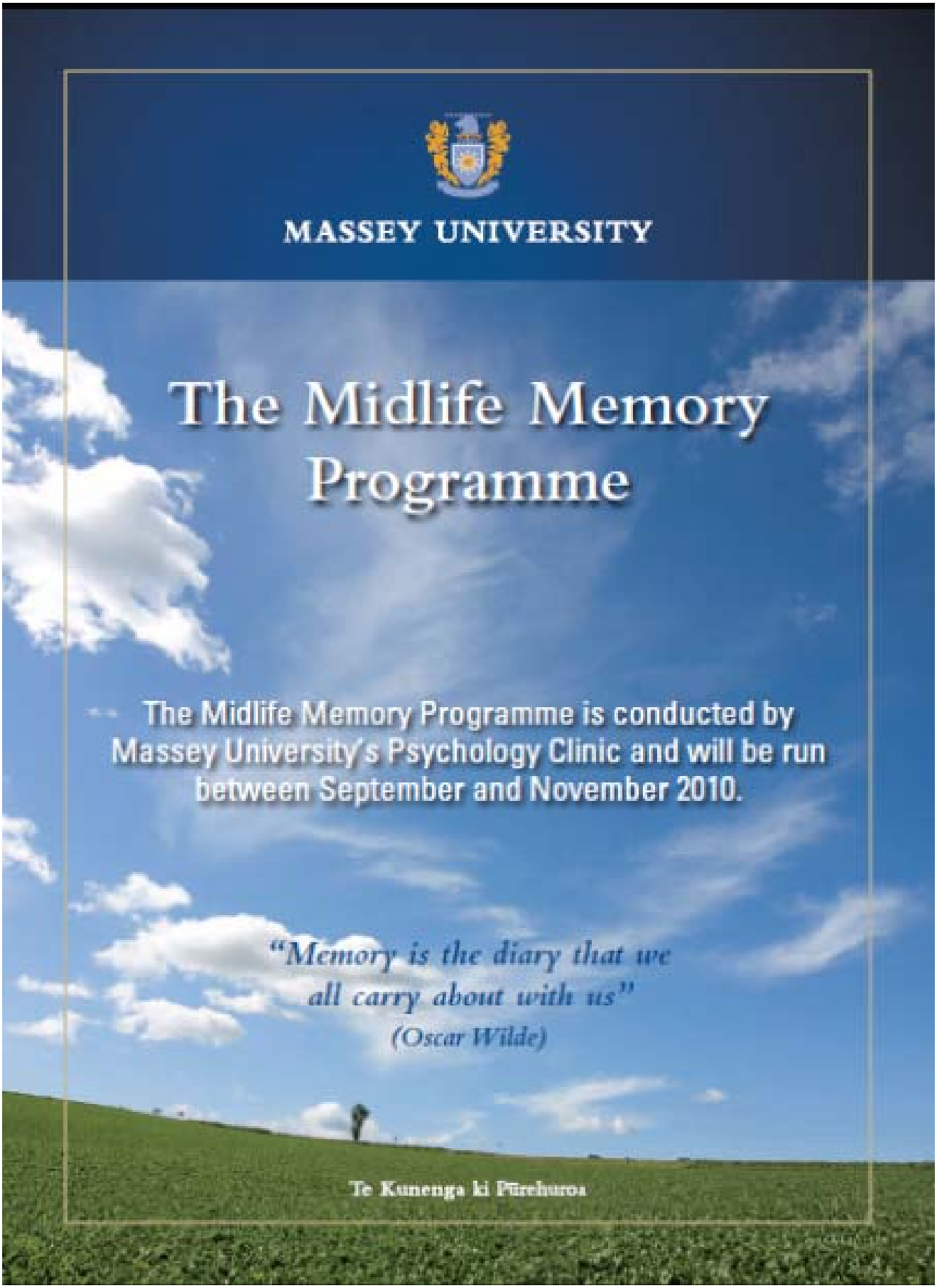
Your help is appreciated.

Thank You!

This project has been reviewed and approved by the Massey University Human Ethics Committee: Southern B, Application 09/23.

If you have any concerns about the conduct of this research, please contact Dr Karl Pajo, Chair, Massey University Human Ethics Committee: Southern B, telephone 04 801 5799 x 6929, email humanethicsouthb@massey.ac.nz.

A.3


MASSEY UNIVERSITY
The Midlife Memory Programme
The Midlife Memory Programme is conducted by Massey University's Psychology Clinic and will be run between September and November 2010.
"Memory is the diary that we all carry about with us"
(Oscar Wilde)
Te Kunenga ki Pūrehuroa

FORGETFULNESS IN MIDLIFE

Midlife is defined as the period of life between the ages of 40 and 65. Midlife can be particularly demanding as middle-aged individuals have to cope with the demands of their careers, parenthood, and often caring for aging parents. Many individuals in midlife experience an increase in forgetfulness and research has shown that most middle-aged people worry about this. The increase in forgetfulness can be due to aging-related factors, but factors such as a person's beliefs about memory and aging, stress, and mood may also play an important role. If you are middle-aged, and think that your memory is not as good as it used to be, you might be interested in the Midlife Memory Programme.

WHAT DOES THE MIDLIFE MEMORY PROGRAMME INVOLVE?

The Midlife Memory Programme was specifically designed to assist middle-aged individuals for whom forgetfulness might be a hindrance in their everyday life. The programme will be held in small groups (7-9 persons per group) and consists of six weekly evening meetings of 90 minutes duration. During the meetings participants will be trained in a variety of memory improvement techniques that have been scientifically proven to be effective. By the end of the programme participants will have the knowledge and skills to use their memory more effectively. In order to monitor each individual's progress, participants write a simple memory diary for the duration of the programme.

PROGRAMME STRUCTURE

Week 1: Personal memory goal selection
Memory strategy training 1

Week 2: Memory systems and processes
Memory strategy training 2

Week 3: Memory and aging education
Memory strategy training 3

Week 4: Contextual determinants of memory performance 1
Memory strategy training 4

Week 5: Contextual determinants of memory performance 2
Memory strategy training 5

Week 6: Review session

WHEN AND WHERE WILL THE PROGRAMME BE CONDUCTED?

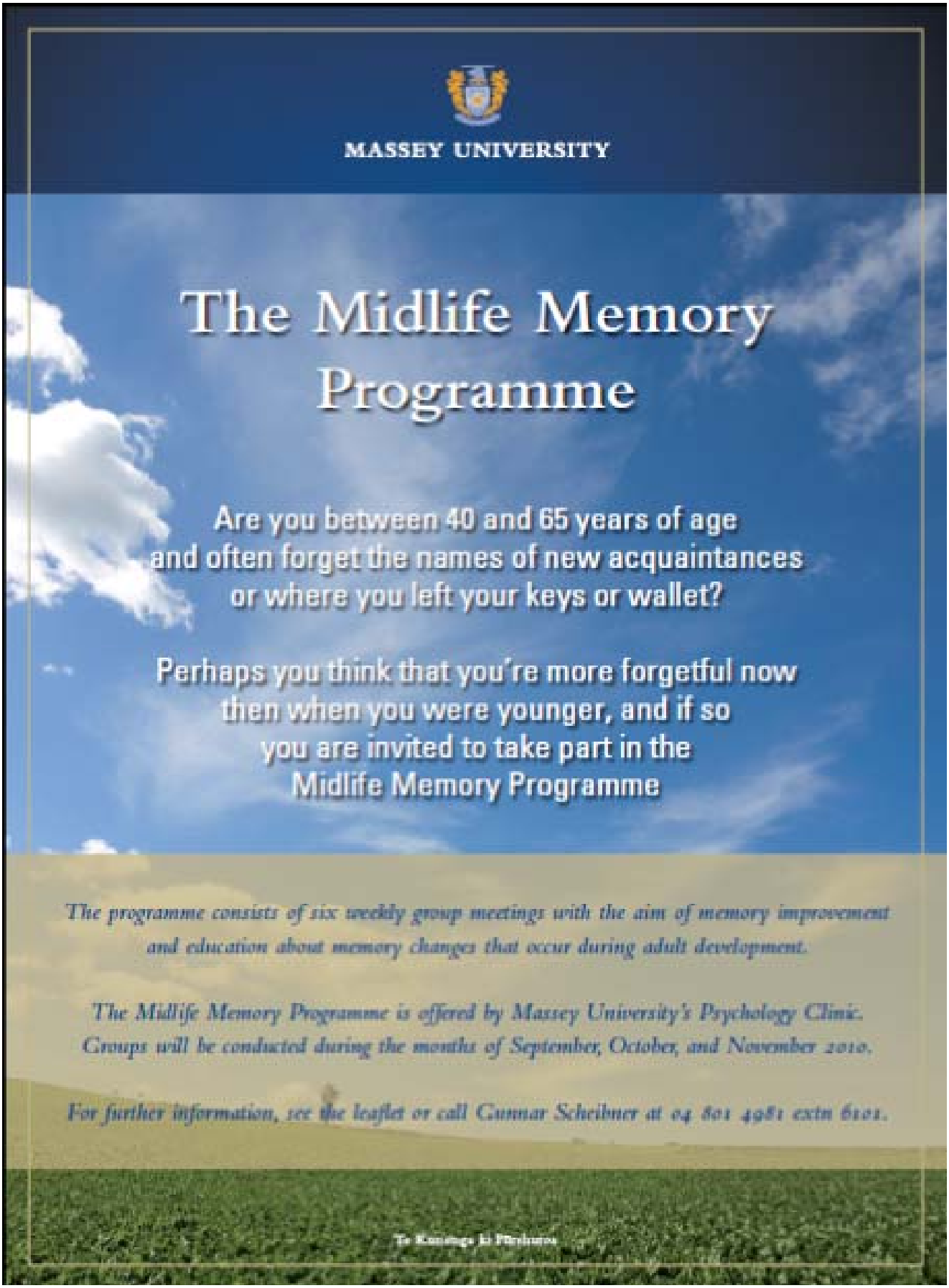
The Midlife Memory Programme will be offered by Massey University's Psychology Clinic in Wellington. The programme will be conducted between September and November 2010. All up, four groups will be formed and each group will meet at one evening of the week. Early applicants may choose on what day of the week they wish to participate.

COSTS

Participation in the programme involves a fee of $186 to cover instructor's time.

APPLICATION DETAILS

In the application details section, please add the phone number: 04 801 4981 extn 6101


MASSEY UNIVERSITY
The Midlife Memory Programme
Are you between 40 and 65 years of age
and often forget the names of new acquaintances
or where you left your keys or wallet?
Perhaps you think that you're more forgetful now
then when you were younger, and if so
you are invited to take part in the
Midlife Memory Programme
The programme consists of six weekly group meetings with the aim of memory improvement and education about memory changes that occur during adult development.
The Midlife Memory Programme is offered by Massey University's Psychology Clinic. Groups will be conducted during the months of September, October, and November 2010.
For further information, see the leaflet or call Gunnar Scheibner at 04 801 4981 extn 6101.

The Midlife Memory Programme

A programme to improve everyday memory performance

for middle-aged individuals

Guidelines for programme facilitators

Programme Rationale

Midlife is most commonly defined as the period of life between the ages of 40 and 65 (Lachman, Lewkowics, Peng, 1994; Lachman & James, 1997). Because research consistently shows that memory starts to decline during midlife it may be said that this reflects an *age-appropriate* developmental change. Individuals who experience age-appropriate developmental changes are generally regarded as individuals who age successfully. A number of studies have examined the extent of subjective forgetfulness among the successfully ageing middle-aged. Cutler and Grams (1988) found that among fifty-five to fifty-nine year olds, 45% reported that they had some difficulties remembering things during the past year. Ponds, Commissaris, and Jolles (1997) found that 33% of young middle-aged (40 to 50 years of age) and 41% of old middle-aged (55 to 65 years of age) individuals report forgetfulness. Moreover, these authors also found that 60% of the middle-aged perceive forgetfulness as an impediment, and 70% were worried about it (Commissaris, Ponds, & Jolles, 1998).

Despite the high levels of forgetfulness among this cohort, most memory intervention efforts focus on the elderly with moderate to severe memory impairment. As a result, very little is done to alleviate normal ageing-related memory difficulties that occur during midlife. Besides the obvious goals of memory training in midlife, interventions in this period of life also have a positive effect on later life stages. It has been argued that the relatively high levels cognitive skills in midlife constitute an ideal time for preventive measures to be applied as the high level of performance increases the likelihood of training gains (Martin & Zimprich, 2005). Indeed, research shows that the earlier cognitive skill training is introduced to individuals with declining memory, the more likely it is that the skills will be used in everyday life (Clare & Woods, 2003). Thus, memory programmes for the middle-aged constitute a viable preventative and prophylactic interventions that potentially reduce more serious cognitive difficulties during later life stages.

The MMP involves six sessions of 90 minutes duration. The format of the programme is structured; however, a certain degree of flexibility is needed to attend to the specific memory goals of individual clients. Sessions 1 to 5 represent the psycho-educational and memory strategy training components while session 6 is a review

session. Table 1 shows the specific objectives of each individual session and Table 2 offers an overview of the structure of each individual session.

Treatment components

The fact that healthy, middle-aged adults experience considerable levels of distress and inconvenience because of age-appropriate forgetfulness has not been given sufficient attention by psychologists. Considering the vast repertoire of memory intervention procedures, it is essential to select procedures that have been found to be effective and useful in everyday situations. The Midlife Memory Programme (MMP) is based on recent research findings and contains three basic treatment components:

- Memory goal selection and pursuit
- Memory and ageing education
- Memory strategy training
- Group discussions

Memory goal setting and pursuit: The MMP strongly emphasises the establishment and attainment of specific memory goals. Generally, when goals are set, motivation, attention, and goal-directed behaviour increase (Bandura, 1989; Locke & Latham, 2002; Schunk, 1991). A number of studies indicate that setting memory goals and striving to attain them improves memory performance and memory self-efficacy. Stadtlander and Coyne (1990) examined the effects of self-set goals and performance feedback on free-recall memory performance. Results showed that both younger and older adults performed better in the goal/feedback condition when compared to the standard recall control condition. Other studies have shown that goal setting results in increased performance, motivation, and self-efficacy, as well as more positive memory beliefs (West, Welch & Thorn, 2001; West, Thorn, & Bagwell, 2003; West, Bagwell, & Dark-Freudeman, 2005) for both younger and older adults.

Memory and ageing education: When individuals are asked to ascribe reasons for their forgetfulness, younger people are more likely to attribute forgetfulness to external causes, while older people blame internal causes (Commisaries, et al., 1997). Thus, as people get older, their memory beliefs tend to shift from perceptions of

forgetfulness as manageable and reversible to beliefs that memory deficits are inevitable, uncontrollable, and age-related. Similarly, many individuals erroneously believe that ageing inevitably involves global reductions in memory performance. The most efficient strategy to reduce negative beliefs about everyday memory failures is to educate people about the difference between normal ageing-related forgetfulness and pathological memory failures (Mol, Groot, Willems, & Jolles, 2006). The meta-analysis by Floyd and Scogin (1997) provided evidence for the effectiveness of education in memory enhancement programmes. Specifically, their analysis showed that memory programmes which incorporate educational material - promoting a realistic understanding of age-effects on memory processes - are most effective. Memory education has also been found to be the most favoured intervention strategy among individuals who consider themselves as forgetful (i.e., 37% of people favour education as memory intervention of choice [Commisaries, et al. 1998]). In light of the strong evidence for the effectiveness of education in memory enhancement, educating participants about the age effects on memory is one of the core components of the MMP.

Memory strategy training: Two meta-analytic investigations that focused on mnemonic training provide clear evidence for the effectiveness of mnemonic strategies. Effect sizes indicated that mnemonic training enhances both subjective and objective memory performance (Floyd & Scogin, 1997 and Verhaeghen, et al., 1992 respectively). In addition, external memory aids may provide support in a number of different ways: 1) they cue or prompt actions or retrieval of information, 2) they serve as an external memory store, and 3) they support knowledge acquisition (Kapur, Glisky, & Wilson, 2004).

Group discussions: Besides education, memory goal pursuit, and strategy training, the MMP also strongly emphasises group discussions during each of the sessions. Group discussions with same-age peers have long been recognised as beneficial (e.g., Chene, 1994; Clough, 1992) as the sharing of personal experience makes learning more meaningful and thus is conducive to the learning process (West, Welch, & Yassuda, 2000). According to Millis, Davidson, and Cottell (1994), comprehension is enhanced by sharing ideas and responding to others, and cooperative learning leads to higher levels of motivation and achievements. West et al. (2000) state that group

discussions may enhance effectiveness of memory strategies because a particular strategy is “advertised” by same-age peers, who report successful application of the technique. Comprehensive memory training programmes that facilitate group discussions have been shown to obtain higher training gains than programmes without them (Verhaeghen et al., 1992). A study by Caprio-Prevette and Fry (1996), where discussions about ageing and memory were part of the intervention was found to be highly effective in terms of increasing memory performance.

A.5.2
Table 1: Tasks and objectives for facilitators

Session 1

A: Introduction and Memory Goal Selection
- Formally introduce the programme, the group members, and the facilitators
- Introduce the concept of memory goals and ensure that participants select specific and realistic goals
- Raise awareness about the fact that enhancing memory performance takes effort

B: Memory Strategy Training 1

Session 2

A: Memory Systems and Processes
- Discuss the memory processes and mechanisms that are influenced by the ageing process

B: Memory Strategy Training 2

Session 3

A: Ageing-related and Pathological Memory Changes
- Normalise the forgetfulness experienced by participants (i.e., provide a clear distinction between pathological and normal ageing-related forgetfulness)

B: Memory Strategy Training 3

Session 4

A: Contextual Determinants of Memory Performance 1
- Discuss the contextual determinants of memory performance

B: Memory Strategy Training 4

Session 5

A: Contextual Determinants of Memory Performance 2
- Discuss the contextual determinants of memory performance

B: Memory Strategy Training 5

Session 6

A: Review session
- Review the course material

Table 2: The Midlife Memory Programme Timetable

Session 1 Memory Goals and Memory Ageing	**Session 2** Memory Systems and Processes	**Session 3** Normal and Pathological Memory Change	**Session 4** Contextual Determinants of Memory Performance 1	**Session 5** Contextual Determinants of Memory Performance 2	**Session 6** Review
Introduction of programme, facilitators, and group members **(10 min.)** Person-specific memory goal selection **(30 min.)** Strategy training (1) **(30 min.)** Diary description **(20 min.)**	Diary discussions **(10 min.)** PowerPoint presentation on memory systems and memory processes **(50 min.)** Strategy training (3) **(30 min.)**	Diary discussions **(10 min.)** PowerPoint presentation on pathological and normal ageing-related memory changes **(50 min.)** Strategy training (2) **(30 min.)**	Diary discussions **(20 min.)** Memory goal revision **(20 min.)** Memory strategy exercise **(20 min.)** Discussion on the contextual determinants of memory performance (1) **(10 min.)** Strategy training (4) **(20 min.)**	Diary discussions **(20 min.)** Discussion on the contextual determinants of memory performance (2) **(10 min.)** The five-part model and everyday memory **(20 min.)** Stress reduction and management techniques **(20 min.)** Strategy training (5) **(20 min.)**	Diary discussions **(20 min.)** Review of course material **(70 min.)**

Memory Strategies

Memory strategies to be taught during the programme are listed below. The order in which these strategies are taught will depend to some degree on the specific problems that are reported by clients (i.e., what sort of instances they report in their memory diaries), and attention must also be given to individual's memory goals. Facilitators must ensure that all strategies listed below have been addressed during the programme.

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Strategies to improve attention capacity

Attention is an important aspect for your memory system. Paying attention is the first step in the process of encoding information into long-term memory.

If you don't attend, it will not be stored in memory, and hence won't be there for you to access as it was just never in memory in the first place.

Possibly the most significant cause of "memory" difficulty and the easiest to fix!!

Tips for improving attention

Sustained Attention

- Schedule regular breaks
- Manage fatigue (although breaks not to be an excuse to be lazy, they are to maximise efficiency).
- Plan shorter activities
- Schedule more time to complete tasks

Focused Attention

- Self-monitor whether you are on task – What am I doing?

Selective Attention

- Reduce distraction/over load/clutter (e.g., turn off TV, put away the laptop, put down the paper
- Use earplugs or headphones/headset - most people won't interrupt someone who's wearing headphones – it's a universal symbol for "please leave me alone", remove clutter, close curtains/door – "Do not disturb" sign).
- Visit smaller stores at less busy times
- Disconnect from the internet
- Sit on the edge of gatherings

Divided attention

- Do one thing at the time
- Develop routines
- Write lists and instructions, breaking down complex tasks
- Retrace steps

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Short Term Memory

At any time many pieces of information compete for the attention of your working memory store. The working memory store is limited to about seven chunks of information at the time and thus you need to make a conscious effort to focus on what you need to remember.

Chunking:
Chunking is a strategy that makes your working memory more efficient by re-coding of the information to be remembered into more manageable chunks.

Working/short term memory has a limited capacity of about 7 units of information that we can remember at the one time. It therefore makes a lot of sense to 'chunk' larger amounts of information into a more manageable number of units. Chunking is particularly useful when you want to remember numbers.

Phone Numbers
4759368 becomes
457 93 68 or
45 79 368

Or you could remember a phone number such as **13101974**, you might want to create chunks such as **13**, **10** and **1974** (these chunks could represent a day, month and year), especially if you wished to remember the number permanently. Or 021 348048 becomes (34 how old I am), 80 (mothers age), (48 how old he is). Thus, instead of having to remember 8 digits or units of information, chunking reduces the information load to three units, making it more likely that the information is transferred from working memory into long-term memory.

INTERNAL AIDS

Remembering Names

Visualisation

To re member names you may use visualisation techniques. Imageing you need to remember the name Dominique Webster. You may come up with the following visualisations:

Dominique  Webster 

Dominique Webster

As with other visualisation strategies the more striking/weird/unusual that a visual image is, the more likely it will be remembered (e.g., your spider web may be as big as a house, the domino pieces may be pink, the stars may be star fish).

Other tips to remember names:

- Make sure you hear the name properly. If in doubt ask for it again. People will be pleased that you cared enough to ask.
- Picture the spelling of the name. Ask yourself, “is it Kathy with K or a C?”.
- Use the names of new acquaintances during conversations with them as often as you can do gracefully.
- Once you’re introduced to somebody, use the person’s name to ask him/her a question. Saying a name strait after hearing it for the first time will greatly increase the chances of remembering.
- At social gatherings review newly learned names after every second or third person.
- After receiving a business card, jot down a few notes on the back of it (i.e., red hair, lives in Levin, square glasses, Hawaii shirt).

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Nametures

Another good way to remember names is to establish nametures. Nametures are name-picture substitutes. Chances are that the picture that you exchange for the name will be easier remembered and will then clue you to remember the name. Obviously if you have a nature that works well for one person use it for every person that you encounter with that name in the future. With a bit of practice (and perhaps some fun) you will have nametures for most people you meet.

Name-Picture substitutes

Females		Males	
Name	**Picture**	**Name**	**Picture**
Abby	*a bee*	Abe	*ape*
Adrienne	*a drain*	Alan	*a lens*
Amanda	*a man*	Alfred	*half red*
Angela	*angel*	Anthony	*ant honey*
Anita	*anteater*	Archie	*archer*
Anne	*ant*	Arthur	*author*
Annabel	*a new bell*	Barry	*berry*
Annette	*a net*	Ben	*bent*
Annie	*a knee*	Bert	*bird*
Becky	*bicky*	Bruce	*bruise*
Brenda	*blender*	Charles	*charred*
Camilla	*camel*	Chris	*cross*
Cynthia	*sin tear*	David	*dazed*
Daphne	*deaf knee*	Donald	*'duck'*
Doreen	*door in*	Ian	*iron*
Eileen	*eye lean*	Jeff	*chef*
Elizabeth	*lizard bath*	James	*'jamys'*
Emma	*hammer*	Jim	*gym*
Germaine	*germ*	Keith	*keys*
Gina	*china*	Kevin	*cave in*
Holly	*holly*	Lou	*'loo'*
Jane	*chain*	Maurice	*more rice*
Jill	*chill*	Nicholas	*nickels*
Julie	*jewellery*	Paul	*pail*
Maggie	*magpie*	Samuel	*a mule*
Martina	*martini*	Steve	*stove*
Monica	*harmonica*	Theodore	*see a door*

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Learning items/procedures & establishing new routines

Method of Loci

Bring to mind a set of steps that are familiar to you, such as a pathway through your house, your walk to work/to the car, a sequence of familiar shops

- Take a moment to mentally walk through your house or walk to your car, or pass by the shop fronts paying attention to important steps along the way so that your metal image of the journey becomes more vivid.
- Along the mental walk, these steps or loci will need to be well defined. This might be the contents of your house (i.e., a chair in the hall, followed by the clock on the wall, kitchen bench etc.), or landmarks on the way to work (War Memorial followed by the French bakery etc.). These steps in this sequence will be what you link things/items you want to remember to (i.e., linking the new thing with something that you already know well).
- Then, you link a visual image of the first items or ideas to be remembered to the first step of your route through the house/to the car, to work, past the shops, e.g., loaf of bread on front doorstep, car registration sticker stuck on the clock etc.
- Just as an aside, the more striking/weird/unusual that a visual image is, the more likely it will be remembered, e.g., a loaf of bread that is so big that it is bulging in the doorway and you can't enter, is weirder than a regular loaf sitting on the doorstep.

Example:
Let's say the first three loci's in my house are 1) the entrance door to the house, 2) my favourite armchair and 3) the guest bed in the study. While I am out walking the dog, I receive a call and I'm not able to take down notes. The caller asks me to do three things: "...to buy the Spiderman DVD for the nephew's birthday party", "... to arrange for the car to be fixed", and "...to get some red wine for Saturday night".

I could easily make the following visualisations during or shortly after the call is finished:

- Spiderman is waiting for me behind the entrance door to attack me...


- ...John, the mechanic who usually fixes our car, is asleep in my favourite arm chair... (although here…best to actually visualise him asleep IN the chair)


- ....and 100 litres of red wine are spilled all over the freshly made bed.


These are all images that were easily generated but are much harder to forget than the actual items I needed to remember. Once I get home, I can retrace my method of loci path to find the clues that remind me what I was ask to do and perhaps write it down then.

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Pegword Method

To use the pegword method you will need to learn a nonsense rhyme off by heart. Take a little time to memorise this:

• One is a bun	• Six is sticks
• Two is a shoe	• Seven is heaven
• Three is a tree	• Eight is a gate
• Four is a door	• Nine is wine
• Five is a hive	• Ten is a hen

The key to success in using the peg system is knowing the rhymes well. The more you use the system, the easier it will get. The idea is to match each of the above items with the things you need to remember:

A.5.4

Pegwords	What you want to remember	Image in your head
One is a bun 	Get rid of the weeds in your garden 	Imagine weeds in a crème bun  
Two is a shoe 	Buy milk 	Imagine favourite shoe about to stamp on a milk carton 
Three is a tree 	Book plane tickets 	Imagine lots of plane tickets hanging from a tree like fruit 
Four is a door	Get new tyres for car	Imagine a door with four wheels attached to it like a car
Five is a hive	Meet bank manager	Imagine the bank manager is attacked by bees
Six is sticks	Look up something on the internet	Imagine chopsticks sticking out of your monitor

Errorless learning: Learn it once, learn it right!

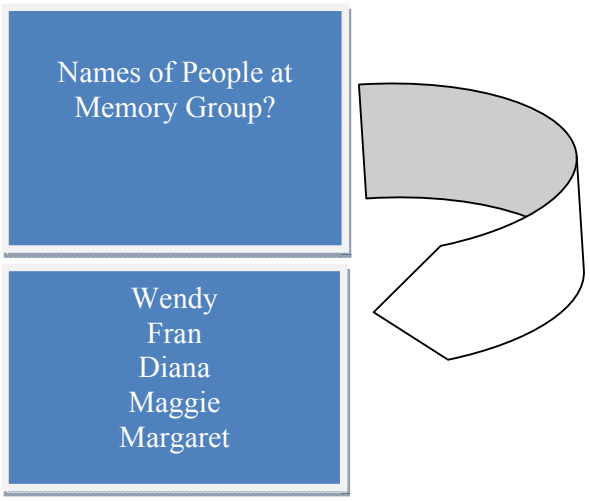
Errorless learning is a technique wherein your objective is to prevent yourself from making errors when initially learning information.

For example, if you have to get your head around new software, it is far better to learn the new process involved once and correctly rather than using a trial and error approach to explore what the software can do.

During learning it is important not to guess steps and be wrong because that step may be incorporated into the sequence next time and be difficult to unlearn. The prevention of errors occurring during learning results in a better memory performance, and is an effective strategy for reducing age-related memory decrement.

When learning a new task or skill:

- Ask an expert or someone who knows it well to explain to you how to do it
- Read manuals of new technology before you try them out
- Write down the sequence of steps involved in the new task or skill
- DO NOT GUESS



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Stories, Acronyms, Acrostics

Stories: Let's say you wake up in the middle of the night thinking about what you need to do the next day. You find you need to renew the insurance policy for the boat, pick up the rug from the drycleaner, go to the dentist, and call the plumber as your central heating system broke down. Rather than getting up to write all this down, make up a story and visualise your dentist sitting on your boat wrapped up in a rug as it is freezing cold.

Acronyms: You can form acronyms by using each first letter of a group of words to form a new word. Common examples of acronyms are SCUBA (Self Contained Underwater Breathing Apparatus) and LASER (Light Amplification by Stimulated Emission of Radiation).
Be aware, it might not always be possible to find a good acronym, however when they do work they are very effective.

How to develop an acronym:

1. Compile the set of items that you want to remember.
2. Arrange all of the first letters of these items in a row on a piece of paper or in your mind.
3. Brainstorm possible sequences of these letters that make sensible and pronounceable combinations.
4. Select the best acronym and write it down.
5. Use this acronym to recall what it is that you wanted to remember a few times and you will find it very easy to use.

Acrostics: Acrostics support recall by creating an entire sentence with the first letter of each word being the prompt for the to-be-recalled information. Thus in order to develop an acrostic, write down all the first letters of what you need to remember and come up with a sentence that is easy to remember.

Examples:

- **Regions of the spine:** Children Thoroughly Love Sweets (Cervical, Thoracic, Lumbar and Sacral).
- **Oceans:** I Am A Person (Indian, Arctic, Atlantic, Pacific)
- **Functions of blood:** Old Charlie Foster Hates Women Having Dull Clothes (Oxygen [transport], carbon dioxide [transport], food, heat, waste, hormones, disease, clotting).
- **Mathematical order of operations:** My Dear Aunt Sally (Multiply and Divide before you Add and Subtract)
- **Sheet music order:** Every Good Boy Deserves Fun (E, G, B, D, F).

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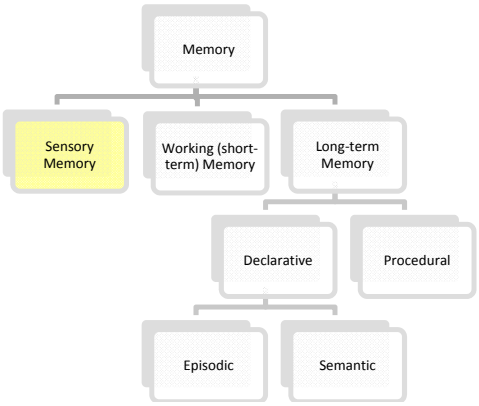
Categorising / organising

To categorise information when you encode it will greatly improve the retrieval rate of the information. As an example, you may need to get the following list of items from the shop later on today: **Pineapple, Wine, Washing up liquid, Sausages, Cheese, Milk, Leek, Onions, Paper towels, Beer, Hand soap, Yogurt, Orange Juice, and Smoked Ham.**

This list of seemingly unrelated items might be difficult to remember when you get down to the shop. However, if you have thought about it in categories when you first thought of what you need to buy you are more likely to remember them as categories and related items within these categories will act as clues for other items:

- **Cleaning utensils:** Washing-up liquid, Paper Towels, Hand Soap
- **Meats:** Sausages, Smoked Ham
- **Fruit and Vegetables:** Pineapple, Leek, Onions
- **Dairy:** Cheese, Milk, Yoghurt
- **Beverages:** Beer, Wine, Orange Juice

Hierarchies:



PQRRST

- Preview: What is this basically about – getting the general picture/sense of the whole?
- Question: What are the main sections/main headings?
- Read:
- Review: What was that about, and what were the general areas?
- Summarise:
- Test:

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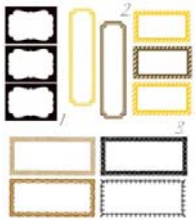
Making Notes

☐ Yellow sticky notes/Outlines/Filing

☐ Coloured dots/Labels/Tags/ Hooks

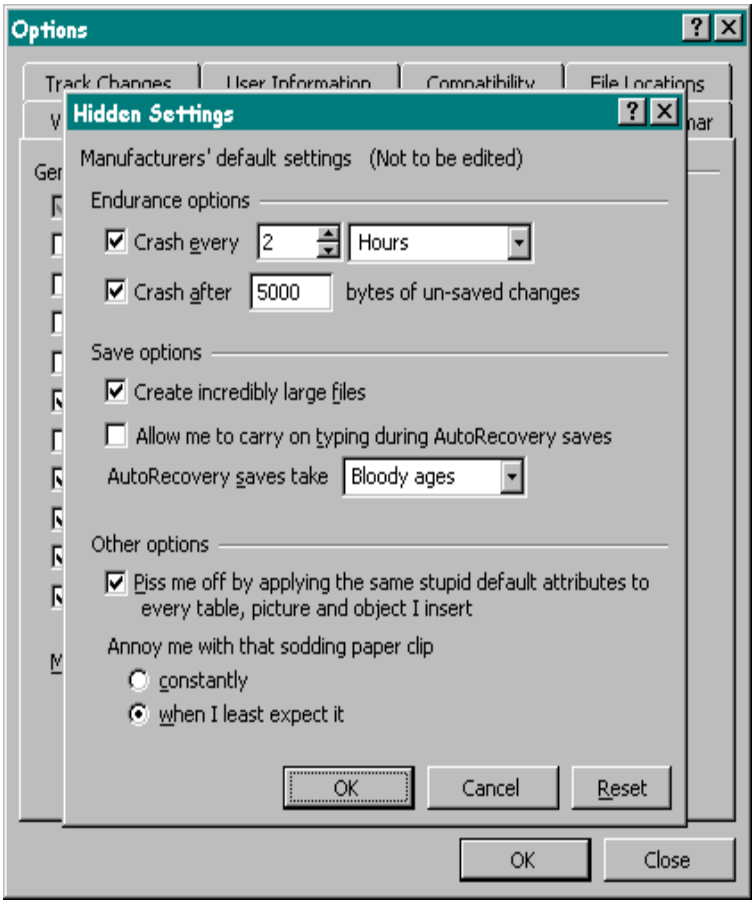


☐ Alarm clock /Watch

☐ Cellphone/ Dictaphone/ PDA/iPad/Computer







EXTERNAL AIDS

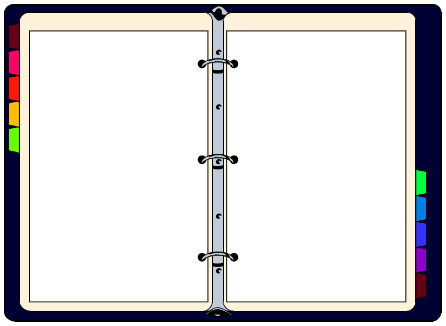
Diary

Most people use a diary of some type to keep track of events that are coming up, (and of course this allows you to check back to remember things that have already happened). Some will keep this material in other ways (desk calendar, outlook, whiteboard in the kitchen – all useful and likely to be more effective than notes of scraps of paper left lying around).

But a diary can be used to keep track of other information as well.

If you accept that organisation and keeping track of things is one of the keys to remembering, then including other sections in a diary or notebook section may be useful. For example:

■ Things to do: A series of blank pages that you can write down all of the things to do today or over the next few days could be another section of the diary, separated by a divider as shown below from the calendar section. You probably keep a to do list already, but keeping track of both diary and to do list in separate places in more difficult to do that if both are in the same place. You can cross off the things as they're done, and throw away the page when it is completed. You might leave your diary open at this section so that you write down the things to do as they occur to you.



■ Names: Useful to have a section for names, perhaps in alphabetical order, and if you can remember the name of the person you want to contact, that's fine (although you could probably look it up in the phone book anyway. But since it's often the case that you can't remember the person's name that you want to contact, i.e., it's the person from class/church/school/golf/work, then it may be more useful to group names by the context that you know the person. You would group all of the people you know from work perhaps on one page. You might even add a small note to each name that distinguishes the person, e.g., Mary is not just the person known at golf, but she has short red hair, drives a green VW and has speaks with a South African accent. This will all assist too in linking the person and their name when you next meet them.

■ Other. There is a range of other material that could be usefully kept in other sections of the diary. e.g., memory lapses, books read/movies seen, wine you liked, currency exchange rates, medication details, the procedure for operating new programmes or equipment, things that you are monitoring (progress at gym, golf, smoking cessation).

Really the idea is just that having the information in one place means that you're more likely to be able to access it when you need it, and then the more often that you are able to do that, the more likely you'll learn the material (and thereby not have to access it). It also ties in with errorless learning – if you are able to look up something immediately rather than guessing, then you're less likely to learn your mistakes.

There are many types of diaries and notebooks. You need to choose a system that suits you. It could be small, large, electronic or paper, basic or very corporate. If it is the latter, it would be good idea to toss out some of the irrelevant pages that come with them…unless you need a lot of pages for your finances! A ring bound diary is useful to allow you to add and delete material. Simple, personalized and organized is best.

The important thing though is to value it, use it and not lose it!!

The Midlife Memory Programme

Session Guidelines for Programme Facilitators

Session 1

Running time

1. Introduction of group members and explanation of the programmes rationale:
(10 minutes)

- The programme starts with a brief introduction of the facilitators. This is followed by a brief self-introduction of clients: "Please tell us your name, what it is you do in your everyday life, and what your specific memory weaknesses may be."
- Briefly describe the programmes rationale, structure and content.
- Explain confidentiality issues that may arise in group settings and ensure that clients agree to keep information about other group members confidential.

10 minutes

2. Discussion about memory goals and memory goal selection:
(30 minutes)

- Introduce the concept of SMART Goals.
- Introduce the concept of memory goals and the effects they may have on memory strategy use and memory performance.
- Brainstorm Exercise: Lead a 10 minute discussion about memory goals that participants may have. Note the reported memory goals on the whiteboard.
- Distribute the goal selection hand-outs (Appendix A.7) and instruct clients to specify their *personal* memory goals as well as the relative importance of each goal. Ensure that the SMART criteria are used when goals are specified. The goals are then to be listed in each client's goal selection sheet.
- The memory goals are discussed within the group and the facilitators must provide feedback on each client's goals (i.e., the facilitators must ensure that goals are specific and realistic). If the goals are not realistic or too general clients should be instructed to refine their goals.

40 minutes

3. Memory strategy training (1):
(30 minutes)

- Introduce the concept of memory strategies. Explain the difference between internal and external strategies and talk about situation where either internal or external strategies may be more useful.
- Pick one or two of the memory goals that have been endorsed by all or most clients and commence strategy training by teaching one or two memory strategies that are useful for those goals.

70 minutes

4. Diary description:
(20 minutes)

- The homework task is the memory diary which clients will be asked to complete for the duration of the course. The memory diary is intended

for clients to record instances of forgetting and the circumstances in which forgetting occurs. The diary contents are to be discussed within the group at the beginning of each subsequent session.

- Encourage clients to practice the strategies learned today.

90 minutes

Session 2

Running time

1. Diary discussions:
(10 minutes)

- For the first 10 minutes of session two, clients are encouraged to discuss the episodes of forgetting that occurred within the last week (i.e., as noted in the diary) with the group.
- In order to keep within the time limit, facilitators may restrict each individual's discussion to a single episode of forgetting.
- The facilitators' role in this exercise is to ask specific questions to establish what might have brought on instances of forgetting (i.e., sleep, stress, mood etc.)

10 minutes

2. Discussion about the stages of memory and memory-related processes:
(50 minutes)

- Distribute hand-outs for session 2 (Appendix A.10).
- Introduce the presentation as an open discussion and encourage clients to ask questions about the material to be discussed.
- Present the PowerPoint presentation on memory systems and processes.

60 minutes

3. Memory strategy training:
(30 minutes)

- Refer back to specific memory failures from the homework discussion and select 2 or 3 strategies from the strategy pool that would have been particularly useful for these instances of forgetting.

90 minutes

Session 3

Running time

1. Diary discussions:
(20 minutes)

- For the first 20 minutes of session three, clients are encouraged to discuss the episodes of forgetting that occurred in within the last week (i.e., as noted in the diary) with the group.
- Clients are encouraged to comment on the memory processes and types of memory that have been involved in the episodes of forgetting.
- In order to keep within the time limit, facilitators may restrict each individual's discussion to a single episode of forgetting.
- The facilitators' role in this exercise is to monitor if participants correctly identify memory types and processes involved in the episode of forgetting.
- The facilitators may also ask specific questions to establish what might have brought on instances of forgetting (i.e., sleep, stress, mood etc.).

20 minutes

2. Power Point presentation on pathological and normal memory changes:
(40 minutes)

- Distribute hand-outs for session 3 (Appendix A.11).
- Introduce the presentation as an open discussion and encourage clients to ask questions about the material to be discussed.
- Present the Power Point presentation on pathological and normal memory ageing.

60 minutes

3. Memory strategy training:
(30 minutes)

- Refer back to specific memory failures from the homework discussion and select 2 or 3 strategies from the strategy pool that would have been particularly useful for these instances of forgetting.

90 minutes

Session 4

Running time

1. Diary discussions:
(20 minutes)

- For the first 20 minutes of sessions four, clients are encouraged to discuss the episodes of forgetting that occurred in within the last week (i.e., as noted in the diary) with the group.
- Clients are encouraged to comment on the memory processes and types of memory that have been involved in the episodes of forgetting.
- In order to keep within the time limit, facilitator may restrict each individual's discussion to a single episode of forgetting.
- The facilitators' role in this exercise is to monitor if participants correctly identify memory types and processes involved in the episode of forgetting.
- The facilitators may also ask specific questions to establish what might have brought on instances of forgetting (i.e., sleep, stress, mood etc.).

20 minutes

2. Personal memory goal revision
(20 minutes)

- Review client's personal memory goals and enquire about the strategies that were taught so far. Ask what strategies were most useful with respect to specific goals. If necessary explain why particular strategies may be more or less effective in different contexts.

40 minutes

3. Memory strategy exercise
(20 minutes)

- Conduct a memory strategy exercise with some of the strategies taught thus far. Clients may work in pairs to provide to-be-learned information / apply memory strategies.

60 minutes

4. Contextual determinants of memory performance (1):
(10 minutes)

- Distribute handout on contextual factors (Appendix A.12). Orally present information about contextual factors that may influence memory performance. Factors to be discussed are general heath, health behaviours and lifestyle factors (see hand out).
- As real life examples for contextual moderators of memory performance, facilitators may utilise client's accounts from the homework discussions.

70 minutes

3. Memory strategy training:
(20 minutes)

- Refer back to specific memory failures from the homework discussion and select 2 or 3 strategies from the strategy pool that would have been particularly useful for these instances of forgetting.

90 minutes

Session 5

Running time

1. Diary discussions:
(20 minutes)

- For the first 20 minutes of sessions four, clients are encouraged to discuss the episodes of forgetting that occurred in within the last week (i.e., as noted in the diary) with the group.
- Clients are encouraged to comment on the memory processes and types of memory that have been involved in the episodes of forgetting.
- In order to keep within the time limit, facilitator may restrict each individual's discussion to a single episode of forgetting.
- The facilitators' role is to ask specific questions to establish what might have brought on instances of forgetting (i.e., sleep, stress, mood etc.).

20 minutes

2. Contextual determinants of memory performance (2):
(10 minutes)

- Distribute hand-out on contextual factors (Appendix A.13). Present the information about contextual factors that may influence memory performance. Factors to be discussed in session 5 are stress, mood / depression, anxiety, memory / ageing beliefs (see hand out).

30 minutes

3. The five-part model and everyday memory performance
(20 minutes)

- Distribute the five-part model hand-out (Appendix A.14). Introduce the five-part model and explain how the five aspects of life experience interact and may lead to everyday memory failures.

50 minutes

4. Stress reduction/management techniques
(20 minutes)

- Distribute hand-outs on progressive relaxation (Appendix A.15) and structured problem solving (Appendix A.16) skills and instruct clients on how to apply these techniques in everyday life to increase memory efficiency.

70 minutes

5. Memory strategy training:
(20 minutes)

- Refer back to specific memory failures from the homework discussion and select 2 or 3 strategies from the strategy pool that would have been particularly useful for these instances of forgetting.

90 minutes

Session 6

Running time

1. Diary discussions:
(20 minutes)

- For the first 20 minutes of sessions six, clients are encouraged to discuss the episodes of forgetting that occurred in within the last week (i.e., as noted in the diary) with the group.
- In order to keep within the time limit, facilitator may restrict each individual's discussion to a single episode of forgetting.
- The facilitator's role in this exercise is to monitor if participants correctly identify types, processes, and contextual moderators of memory, as well as strategies that could have been used to prevent forgetting.

20 minutes

2. Revision of course material:
(10 minutes)

- Distribute the revision hand-out (Appendix A.17) and present the information session by session:
  - Goal setting / pursuit
  - Memory systems / processes
  - Normal / pathological ageing-related memory change
  - Contextual determinants of memory
  - Five part model and memory
  - Stress reduction and management
  - Memory strategies

30 minutes

3. Personal memory goal revision
(20 minutes)

- Review client's personal memory goals and enquire about the strategies that were taught so far. Ask what strategies were most useful with respect to specific goals. If necessary explain why particular strategies may be more or less effective in different contexts.

50 minutes

4. Relapse prevention planning and clients questions / concerns:
(40 minutes)

- Discuss relapse prevention planning (Appendix A.17, page 265 only)
- Encourage clients to ask questions and raise any concerns that they may have

90 minutes

The Midlife Memory Programme:
A course to reduce everyday forgetfulness

[Pre-programme hand-out for clients]

Welcome to the Midlife Memory Programme

The Midlife Memory Programme is designed to reduce forgetfulness and cultivate an understanding about memory as a modifiable rather than an ever decreasing body of skills. During the programme we will examine how memory relates to the ageing process, and you will learn techniques and strategies that you can use to reduce or eliminate forgetting that may bother you in your everyday life. While each session addresses a particular topic the six sessions are designed to build on one another. We therefore recommend that you try to attend all six meetings so that you will maximise the benefits from the programme. The programme covers a number of specific goals and learning objectives including:

- **Setting personal memory goals**: It is essential that you think about and specify what exactly it is that you forget in your everyday life. Some people may be particularly bothered by forgetting names while others have no difficulties with this but keep forgetting where they parked their car. Whatever it is that you forget on a regular basis we need to know about it so that we can provide you with the best strategies to eliminate or reduce your particular memory difficulties.
- **Memory systems education**: There is now abundant evidence that memory is not a singular function and that different memory functions are differentially affected by the ageing process. Knowing how your memory system works and how different aspects of your memory relate to the ageing process is another vital part in the effort to improve your memory. Think about this: Is your memory worse for verbal or visually presented information? Are you forgetful because information didn't 'go in' or is the problem with 'getting it back out'? These are the type of questions we want to examine with you in this module of the course. Once we have a better understanding about what's going on for you, we are in a better position to choose specific strategies that will work best for you.
- **Memory and ageing education**: Unfortunately, there are many stereotypes and misconceptions about memory and ageing. We know that people who buy into such stereotypes are much more likely to

report to be forgetful as beliefs are powerful determinants of memory performance. We therefore need you to understand what's really going on with your memory as you get older in order to maximise the potential for improvement.

- **Memory strategy training**: During each session, time is set apart to talk about and practice memory strategies. In order to teach you the strategies that are most relevant to you, we will ask you to keep a simple memory diary so that each week we have specific examples about what it is that you forget in your everyday life.
- **Memory performance and daily life**: Memory performance is known to be influenced by what you do, how you feel, and what you think. If you haven't slept well for a while, worked a lot of overtime, and felt exhausted, then your memory will be worse than it is normally. Knowing what the factors are that may negatively impact on your ability to remember will make it easier for you to avoid them and improve your memory.

On the following page you can see the structure of each individual module. If you have any concerns or questions about any aspect of the programme you can talk to the instructors at any time:

Gunnar Scheibner (Doctoral Student) **telephone: 021 02518784**
Dr Janet Leathem (Supervisor) **telephone: 04 801 5799 Ext 62035**

Strucutre of the Programme

Week 1 Memory Goals and Memory Ageing	**Week 2** Memory Systems and Processes	**Week 3** Normal and Pathological Memory Changes	**Week 4** Contextual Determinants of Memory Performance 1	**Week 5** Contextual Determinants of Memory Performance 2	**Week 6** Review Session
I. Introduction of programme, facilitators, and group members II. Personal memory goal selection III. Memory strategy training (1)	I. Memory Diary discussions II. PowerPoint presentation on memory systems and memory processes III. Memory strategy training (2)	I. Memory Diary discussions II. PowerPoint presentation on pathological and normal memory changes III. Memory strategy training (3)	I. Memory Diary discussions II. Group discussion on the contextual determinants of memory performance (1) III. Memory strategy training (4)	I. Memory Diary discussions II. Group discussion on the contextual determinants of memory performance (2) III. Memory strategy training (5)	I. Memory Diary discussions II. Review of course material

Memory Improvement:
The Good News and the Bad News

The good news is that memory performance can be improved considerably. Now that you have signed up for this course, you are on your way to improve your memory. Scientific research has shown that the strategies and procedures used in this programme are effective methods to enhance memory performance throughout the adult life span. What you will learn during the programme will be directly transferable to your everyday life and your day to day memory should improve considerably by taking part in this course.

The bad news is that memory improvement takes effort. Be aware that there is no quick and easy way to improve your memory. If you want to improve your memory you need to work on it and practice what you learn with considerable effort. While some memory strategies are easy to learn and use, others will take some time and effort to learn and execute before the benefits will show. The more effort you put in, the more your memory will improve.

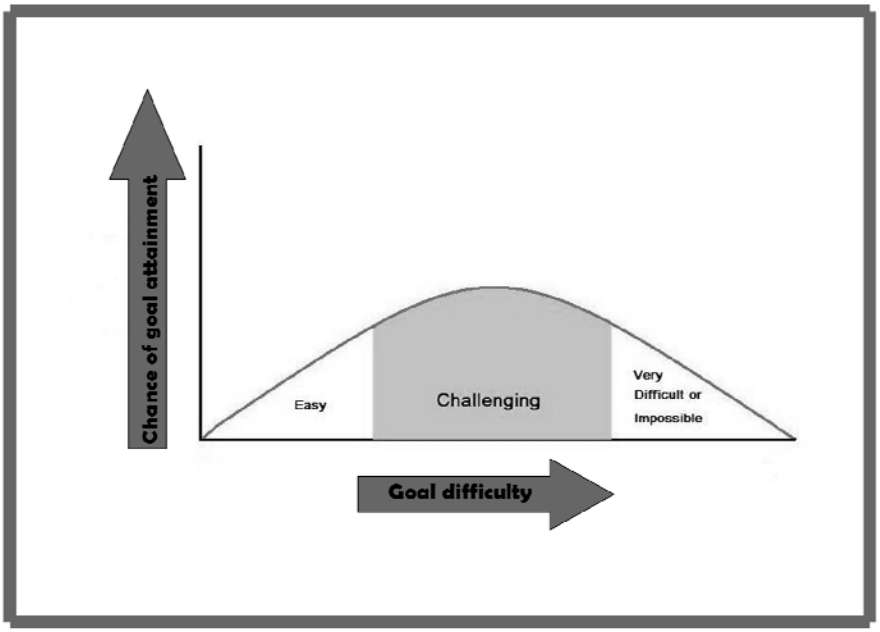
Memory Goal Setting

Setting goals and striving to achieve them has been shown to increase performance in various domains. For example, athletes who set goals perform better than those who do not. The same is true for students – those who set study goals perform better that those who do not. The same is also true for memory improvement. Research has shown that if you set memory goals before you start trying to improve your memory, your memory improvement efforts are more likely to be rewarded. It is for this reason that one of the core elements of our programme is memory goal selection and pursuit.

During the first meeting we will spend some time to identify and prioritise the memory goals that you and other group member may have. Two important aspect of goal-setting are to be specific and to prioritise them in order of importance. Rather than having the goal of improving your memory generally, think about all the things you have forgotten in the past and decide what instances of forgetting annoy or worry you the most. For example, if you have a lot of difficulties remembering names and this often leads to embarrassing situations, make remembering names one of your top priority goals for this course. If forgetting to buy an item in the shops only happens ones in a while and this doesn't bother you too much, consider this to be a goal of less importance. You may have any number of memory goals, it doesn't matter as long as you specify and prioritise them.

Before you come to the first group meeting we would like you to think about some memory goals that you may have. Memory goals are most useful if they are challenging rather than being too easy or too hard. You will therefore maximise the benefits of goal setting by defining memory goals that are realistic and attainable but also require some effort. Once we have identified your memory goals, we are on the way to work on finding the right strategies that will be needed in order for you to attain these goals.

Maximising the Effectiveness of Your Memory Goals



The Memory Diary

During the course of the programme, attention will be give to each group member's memory experiences. While some instances of forgetting (such as forgetting names) might be a very common experience for all or most group members, there may also be specific episodes of forgetting that only apply to one or two members of the group (i.e., forgetting to take medicine, forgetting what was said in yesterday's meeting). In order to help you with your specific memory difficulties we will ask you to keep a simple memory diary for the duration of the programme. This diary will only take a couple of minutes a day to complete. The aim is to note what it is that you have forgotten, what you were doing at the time of forgetting (and remembering), how worried you were about it, and what you could have done to remember better (see the example diary sheet on the next page). At the beginning of each session (sessions 2-6) we will discuss some of the memory experiences that individual group members have recorded in their diaries. This diary exercise is a very important aspect of the programme as it will allow us to examine what exactly happens when you forget and why. Knowing when and why you forget enables us to work out exactly what strategies are most likely to be of benefit to your particular memory problem. At our first meeting we will explain the memory diary exercise in more detail.

Memory Diary Example:

When did forgetting/ remembering occur?	What happened? How worrying? 1= not at all 10= very worrying		What did I do?
Monday 7am	Couldn't recall whether work meeting is today or tomorrow. Worried that I am not prepared for this if it is today.	7	Checked my diary, the meeting was not in the diary either today or tomorrow. Remembered that I told my wife about the meeting, so I ask her. She remembered that the meeting is on Monday next week. Noted the meeting in my diary and the wall planner.
Tuesday 1pm	Suddenly remembered that I was supposed to call John last night about planning the trip for the weekend. Had to work late last night, and was annoyed because the computer crashed.	3	Called John right then.
Thursday 9 pm	Was out for dinner with sports club. Mixed up names of two new members who joined us a month ago. Was a little embarrassed, thought I really should know by now. Had a few beers that evening, thought that might have something to do with it.	5	Tried to remember the names by linking...

Memory Goal Selection Sheet **Name:** **Date:**

Instructions: Please list the specific memory goals that you may have and rate how important it is to you to attain each individual goal.

Future Memory Goals	How important is it that you attain this goal?
1)	1 2 3 4 5 6 7 Not at all important Very important
2)	1 2 3 4 5 6 7 Not at all important Very important
3)	1 2 3 4 5 6 7 Not at all important Very important
4)	1 2 3 4 5 6 7 Not at all important Very important
5)	1 2 3 4 5 6 7 Not at all important Very important
6)	1 2 3 4 5 6 7 Not at all important Very important
7)	1 2 3 4 5 6 7 Not at all important Very important
8)	1 2 3 4 5 6 7 Not at all important Very important
9)	1 2 3 4 5 6 7 Not at all important Very important
10)	1 2 3 4 5 6 7 Not at all important Very important
11)	1 2 3 4 5 6 7 Not at all important Very important
12)	1 2 3 4 5 6 7 Not at all important Very important

Instructions: Please look at your memory goals selection sheet and rate to what degree you have currently attain each individual goal.

Name: **Date:**

Current Goal Attainment Status

Goal 1……. …… **1 2 3 4 5 6 7**
Goal not Attained Goal Attained

Goal 2……. …… **1 2 3 4 5 6 7**
Goal not Attained Goal Attained

Goal 3……. …… **1 2 3 4 5 6 7**
Goal not Attained Goal Attained

Goal 4……. …… **1 2 3 4 5 6 7**
Goal not Attained Goal Attained

Goal 5……. …… **1 2 3 4 5 6 7**
Goal not Attained Goal Attained

Goal 6……. …… **1 2 3 4 5 6 7**
Goal not Attained Goal Attained

Goal 7……. …… **1 2 3 4 5 6 7**
Goal not Attained Goal Attained

Goal 8……. …… **1 2 3 4 5 6 7**
Goal not Attained Goal Attained

Goal 9……. …… **1 2 3 4 5 6 7**
Goal not Attained Goal Attained

Goal 10……. …… **1 2 3 4 5 6 7**
Goal not Attained Goal Attained

Goal 11……. …….....1 2 3 4 5 6 7
Goal not Attained Goal Attained

Goal 12……. …….....1 2 3 4 5 6 7
Goal not Attained Goal Attained

Memory Diary

Name: Week of Programme: **1** 2 3 4 5 Date:

When did forgetting/remembering occur?	What happened? How worrying? 1= not at all 10= very worrying		What did I do?

A.9

Memory Diary

Name: Week of Programme: 1 **2** 3 4 5 Date:

When did forgetting/remembering occur?	What happened? How worrying? 1= not at all 10= very worrying		What did I do?

Memory Diary

Name: Week of Programme: 1 2 **3** 4 5 Date:

When did forgetting/remembering occur?	What happened? How worrying? 1= not at all 10= very worrying		What did I do?

Memory Diary

Name: Week of Programme: 1 2 3 **4** 5 Date:

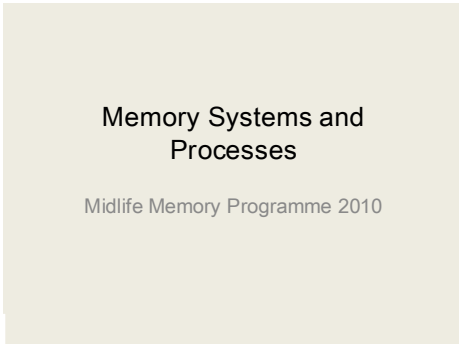
When did forgetting/remembering occur?	What happened? How worrying? 1= not at all 10= very worrying		What did I do?

Memory Diary

Name: Week of Programme: 1 2 3 4 **5** Date:

When did forgetting/remembering occur?	What happened? How worrying? 1= not at all 10= very worrying		What did I do?

PowerPoint Presentation / Hand-out Session 2



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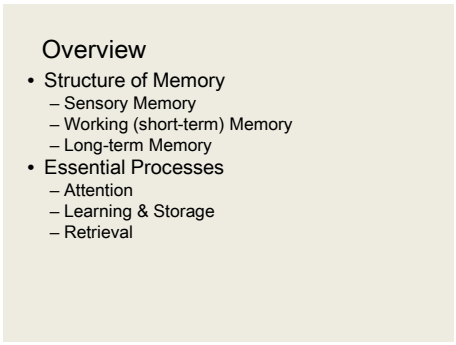
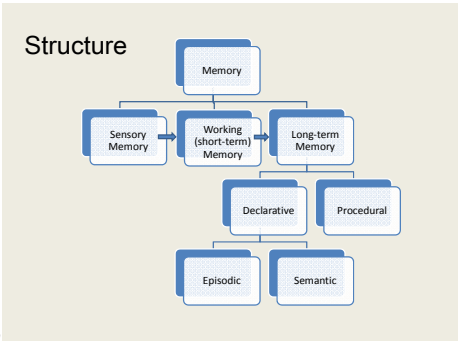


2

Slide 1: Last week we established your personal memory goals. The next step of the programme is to gain a clearer understanding of how exactly memory works. Knowing how the memory system functions is a vital step in our effort to improve memory performance. Today we will examine memory systems and processes.

Slide 2: This is an overview of the topics that will be covered in today's session. There are three types of Memory Sensory Memory Working or short-term Memory Long-term Memory And memory depends on three Essential Processes Attention Learning & Storage Retrieval We'll briefly cover all of these.



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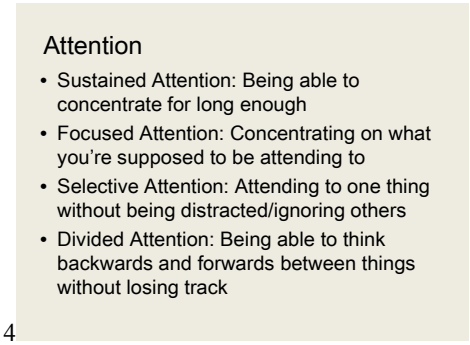

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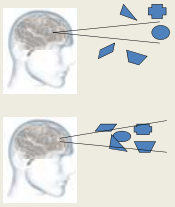
Slide 3: Memory used to be thought of as a unitary function, but it is now known that memory has a number of distinct functions including sensory, working memory and long-term memory. The objective is to move material whether verbal, visual or even physical (that is how to do things) into long-term memory. Doing this successfully means that material must move along from sensory, to short term in order to arrive at long term storage. As you see Long Term Memory is subdivided. It will be good to look at this later, as some parts of memory improve with age and some decline. So….Sensory memory…. is what is VERY briefly going on around you, e.g., cars going past outside, someone sneezing, a person laughs/ back ground noise – the hum of the overhead projector is a good example. You will never remember it unless you attend to it! (And now that you are attending to it, it is likely to be a distraction!) Sensory memory DOES NOT decline with age (unless there are hearing/visual problems…then these very fleeting phenomena are likely to be less distracting!!) So good to talk about attention BEFORE moving to short term memory.

Slide 4: Attention, or the lack of it, is the single most important factor responsible when memory seems to fail. I use the word "seems" because actually if you didn't attend to something, you didn't learn it, and if something isn't learnt, then it is not in memory at all….So no wonder you can't remember. Attention is of various types too. Sustained attention refers to being able to concentrate for long enough (90 minutes in the case of this group). Focused attention is concentrating on what you're supposed to be attending to rather than thinking about what you'd like for dinner or what you're doing at the weekend. Selective attention refers to attending to one thing without being distracted by hunger pangs or tiredness after a long day at work. Divided attention: Being able to think backwards and forwards between things without losing track (shall I have gin and tonic or a chardonnay when I get home….hhmmm do we have any tonic….did I get some at the supermarket on Saturday? No. Right Chardonnay then.)

5

Selective and divided attention

- Attending to one task over others requires selective attention
- Divided attention refers to the ability to respond simultaneously to multiple tasks



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Source: http://psdho.me

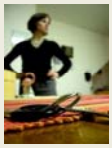
Slide 5: This slide illustrates the difference between selective and divided attention. Imageing comfortably reading the newspaper while the TV is running in the background and a conversation is going on right beside you. That is selective attention. Divided attention refers to the ability to respond simultaneously to multiple tasks. This type of attention is much more difficult to maintain. The fact that talking on a handhold mobile phone while driving is prohibited is testimony to the fact that dividing attention is difficult and often dangerous.

Slide 6 and 7: Take Car keys for example!! We've all spent time (a lot of time) trying to find them at Home or at work...

7

Source: http://www.x17online.com

8

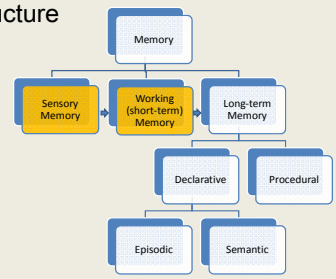


texas.inetgiant.com

Slide 8: ...and you may have gone around the shops to re-trace your steps looking for your keys. The problem is attentional. You heard the oven timer, go and taken out the dinner, and then stood in the kitchen wondering what you came downstairs for!! A problem with divided and selective attention.

9

Structure



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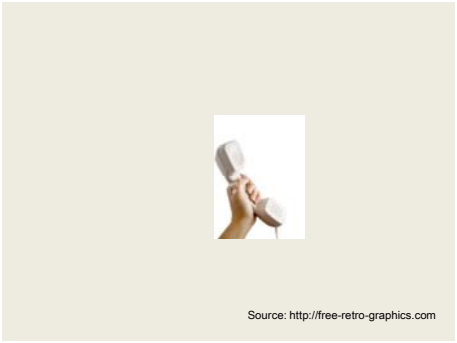
Smith A.R.4964389
Smith A.S.4758943
Smith A.T. 9466104

Slide 9: Attention then is vital for material to move into short term memory, but it is also very important (along with other processes) for working memory as well as the formation of long-term memories. So…onto working memory and short term memory.

Slide 10: A good example of short term memory is remembering a phone number after looking it up. You find AS Smith and

11



12

475....8943 or
475 ...89...43

Slide 11: Go to dial. and you forget – it is not a surprise, short term memory capacity is very limited. You can only ever remember 7+-2. It is no wonder you forget! Better to write it down/ certainly avoid distraction, but you could do something else…organise it better for storage and rehearse it. For example….

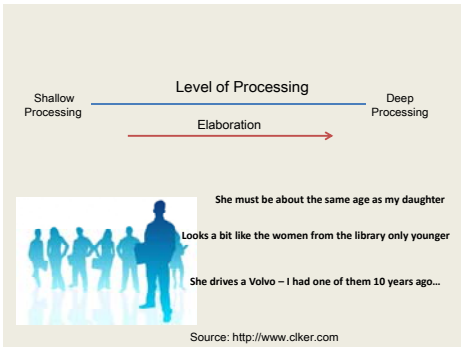
Slide 12: You could chunk it….Doing this is encoding the material

13

Encoding

- Shallow
  - encoding of information on a superficial level, leads to fragile memory traces & susceptible to rapid decay, e.g., phone number above
- Deep
  - encoding of information on a meaningful level and relies on elaboration. Elaboration is the process that creates a link between the material to be learned and information already in the memory store.

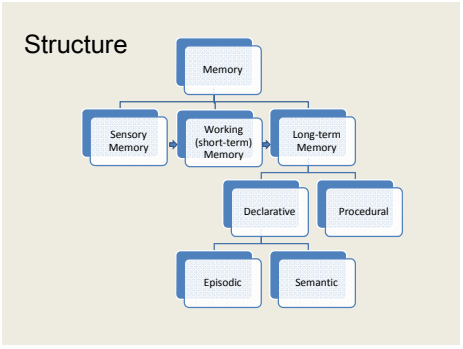
14



Slide 13: Encoding means doing something with the initial information that assists with storage. Encoding is important for moving material from short-term to long-term storage. Shallow encoding is encoding of information on a superficial level, leads to fragile memory traces and is susceptible to rapid decay. Deep encoding refers to encoding of information on a meaningful level and relies on elaboration. Elaboration is the process that creates a link between the material to be learned and information already in the memory store.

Slide 14: Think about the level of processing you might engage in as a continuum from shallow to deep. The more you elaborate, the more likely it is that the information will be remembered at a later time. Let's say you are meeting someone for the first time. Try to connect this person with information that is already in your memory. Ask yourself some questions that will relate the person to what you know: She must be about the same age as my daughter. Looks a bit like the women from the library only younger. She drives a Volvo – I had one of them 10 years ago

15

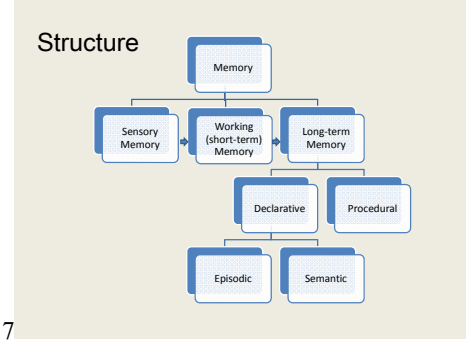


16

Slide 15: When people think about memory though what they are really thinking about it Long-term Memory. Long term memory is of two types….Memory for information, facts, and events is *declarative*, while memory for systems or *how to do* things is *procedural*.

Slide 16: Take knowing how to ride a bike, or knowing where keys are on a key board. This type of memory is very resistant to normal ageing or decay – once you know how to drive a car or ride a bike, it comes automatically. It might have been a long time since you last did it, and you may lack confidence, but you still remember "instinctively" how to do it. Where is the "S" key on a computer key board for example. Most know, but only by feeling for it – it is so automatic by now. How to learn *new* ways of doing things though is different – don't assume that you'll remember – write down the steps. Have someone who recently learned how to do something, or a professional, teach you how to play golf, drive a car, or how to operate the new computer programme. People who know well how to do something, often can't remember all the steps – as anyone knows, leaving one step out can be relationship threatening - frustrating for both the teacher and learner.

17



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Slide 17: The other side of Long Term Memory is Declarative Memory. This can be viewed in two ways. On the one hand memory for facts, knowledge and what things mean is known as *semantic* memory. This is information that we all share, knowledge for example that there are 365 days in the year, that Rome is the capital of Italy. The other side is episodic, i.e., your *personal* experience of *being* in Rome, your personal memories of anything in the past. You know for example that...

Slide 18: ...the destruction of the twin towers occurred on September 11th. This information *does not deteriorate* once it is in memory. In the example of the twin towers, you will all have your own *personal* or episodic memory of September 11. Think back, where you were when you heard about what had happened, who told you, what time of day was it? This area of memory is the most highly developed of all memory systems, and is thought to be specific to humans. While semantic memory – knowing that this event occurred on September 11 – becomes more reliable over time, episodic memory is likely to become frayed around the edges with time. But most don't complain about memory lapses about distant memories….they may be unreliable, but most people are not aware of that, and it probably doesn't matter anyway.

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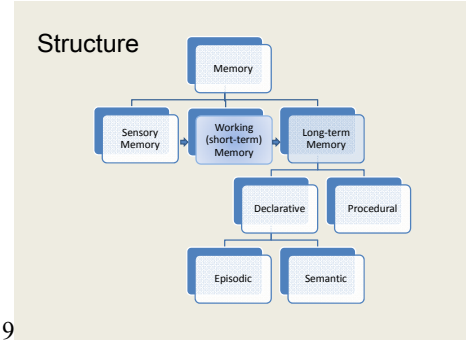

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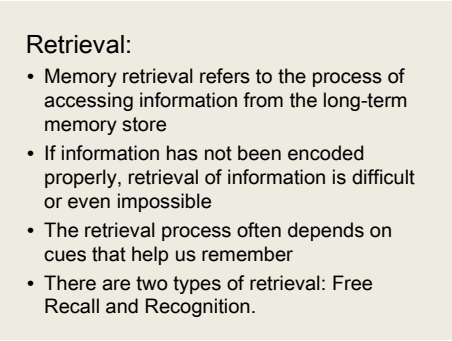
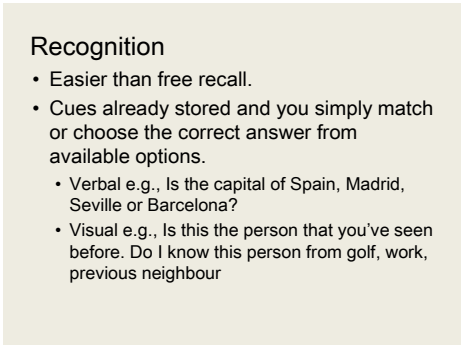
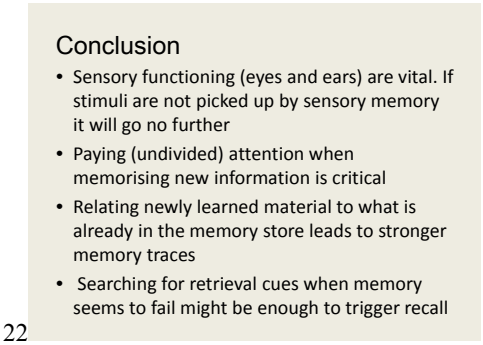


Slide 19: Attention then is vital to move information from sensory into short term memory, and very important (along with other processes) for working memory to move information into long term memory. We've talked briefly about the importance of encoding for memory to function. Now to the final process – retrieval

Slide 20: Memory retrieval refers to the process of accessing information from the long-term memory store. If information has not been encoded properly, retrieval of information is difficult, unreliable or impossible to retrieve. That is, the information may be there but we do not have the code to be able to access it. The retrieval process often depends on cues that help us remember. There are two types of retrieval: Recall and Recognition. What is the capital of Spain is an example of free call





Slide 21: Recognition is easier than recall, as the information to be remembered is provided as a cue. Cues are already stored and you simply match or choose the correct answer from available options. For example Is the capital of Spain, Madrid, Seville or Barcelona? A question that provides you with verbal cues. Is this the person that you 've seen before?. By asking yourself if you know this person from golf, work, or the bridge club you provide yourself with useful cues

Slide 22: Sensory functioning (eyes and ears) are vital. If stimuli are not picked up by sensory memory it will go no further. Paying (undivided) attention when memorising new information is critical. Relating newly learned material to what is already in the memory store leads to stronger memory traces. Searching for retrieval cues when memory seems to fail might be enough to trigger recall

PowerPoint Presentation / Hand-out Session 3

Memory and Aging:
Normal and pathological memory changes

Midlife Memory Programme 2010

1

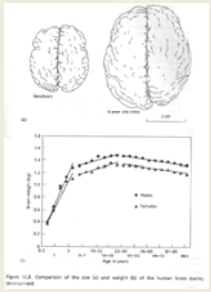
Overview

- **The aging brain**
- **Normal memory change (and stability)**
  - Sensory memory
  - Working memory
  - Long-term memory
- **Abnormal memory changes**
  - Dementias
- Risk factors
- Protective factors

2

Slide 1: Mild memory decline is a typical part of the normal ageing process and virtually all older adults report declining memory. Today we will talk about the memory changes that may occur as we age. While we do this we will look at the normal - to be expected - memory changes as well as pathological memory changes. Normal memory changes refer to changes in memory that will naturally happen for all - or at least most of us - as we age. Pathological memory changes refer to conditions such as Alzheimer's Disease which we will also talk about later on.

Slide 2: This is an overview of what topics we will discuss today. We will begin by briefly looking at the changes that happen to the brain as we age. We then look at *normal* memory change as well as stability. We will refer back to the memory system we looked at last week as some of the memory types we talked about stay the same or improve while others will decline with age. And finally we will examine memory changes that are considered abnormal or pathological.



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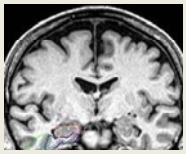

Source: http://brainfunctionss.com

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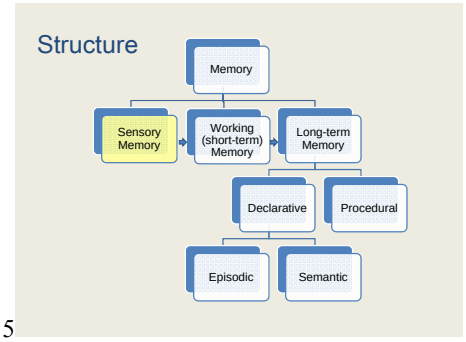
Slide 3: Since memory is the responsibility of the brain let's just see what happens with age. The brain increases in size from the small size of a neonate seen here, to the brain at age 6, to its full development by the age of 20 weighing approximately 1.3 kg's…or the weight of a not quite full small bag of Chelsea sugar. After the age of 20-25, there is a very gradual decline in size that accelerates over time.

Slide 4: The gray matter, which are the cells, and the white matter, which are the connections between cells, reduce, particularly over the front of the brain, especially in the *very* front and in the hippocampus the area circled in red (There are two hippocampus' one on each side). The hippocampus is essential for memory, and the front of the brain for complex problem solving and working memory (amongst other things). At the same time the spaces within the brain increase and blood flow decreases. Since brain regions and cognitive activity are so closely related, it no surprise that the activities undertaken by those areas showing most reduction. So, memory functioning is of course what we are most interested in.



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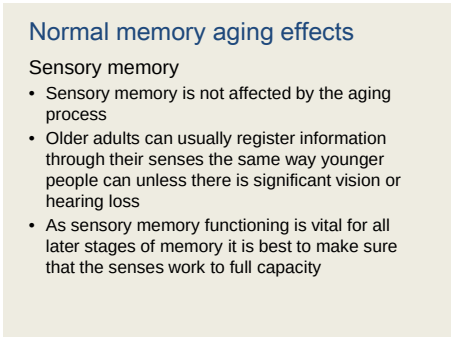

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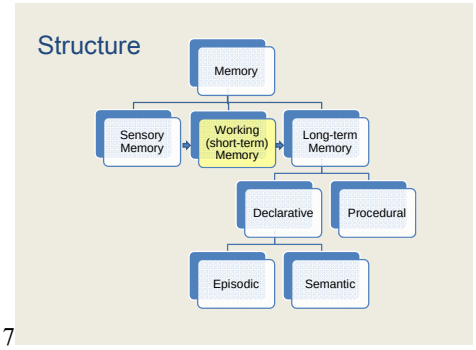
Slide 5: This is the structure of memory from last week. Let's start with sensory memory

Slide 6: Sensory memory is not affected by the ageing process. Older adults can usually register information through their senses the same way younger people can unless there is significant vision or hearing loss. As sensory memory functioning is vital for all later stages of the memory system it is best to make sure that the senses work to full capacity.



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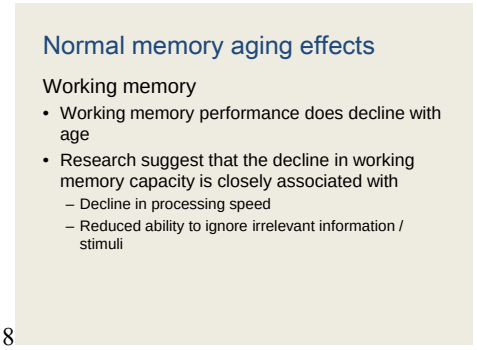

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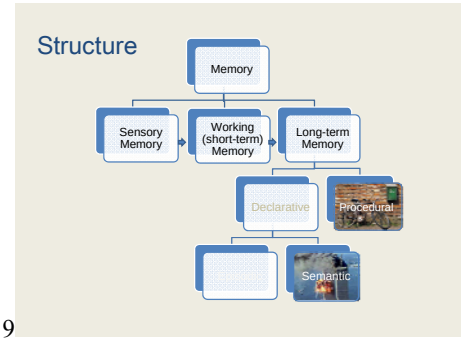
Slide 7: And working memory.

Slide 8: Working memory performance does decline with age. Research suggest that the decline in working memory capacity is closely associated with the decline in processing speed we talked about before but also with a reduction in the ability to ignore irrelevant information.



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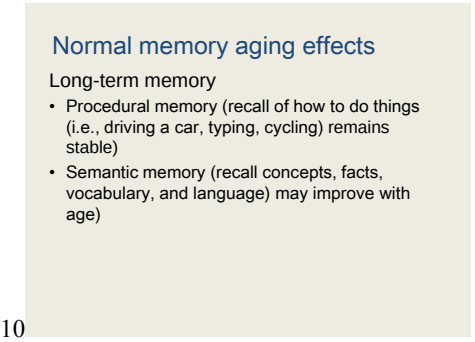

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Slide 9: Long term memory! This is really the area that causes most concern! Procedural memory (riding a bike/playing guitar/golf swing etc) stays the same. Semantic memory (part of declarative memory) improved, i.e., you are more and more likely to remember that the twin towers terrorist attack was on September 11th.

Slide 10: So to recap: Procedural memory is recalling how to do things (i.e., driving a car, typing, cycling) remains relatively stable. Semantic memory refers to our ability to recall concepts, facts, vocabulary, and language and may even improve as we age.

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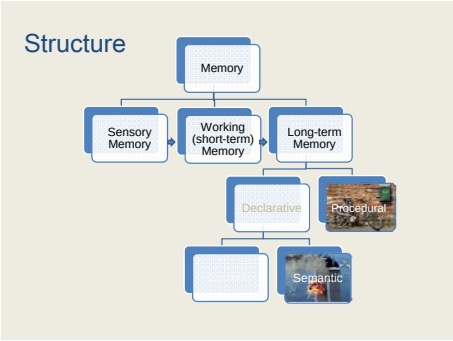

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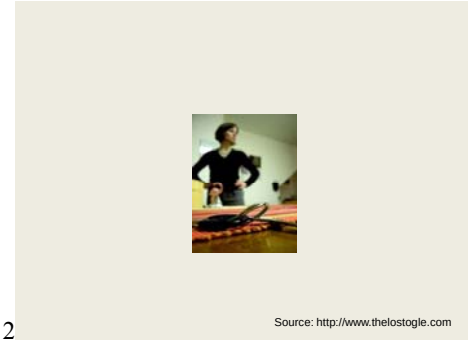

Slide 11: But…Episodic memory!!! Last week we talked about episodic memory for the past….so when you think about your PERSONAL experience of Sept 11th, your recall becomes less and less precise over time! A bit blurred around the edges! You think that you remember something accurately but chances are … you don't! Not a big issue. BUT episodic memory for here and now events ones that have just happened or are about to or should happen are what is the biggest problem, i.e., forgetting something even if you HAVE attended to it and encoded/stored it.

Slide 12: You still can't remember where you put things, why you went somewhere, what you're supposed to do next.

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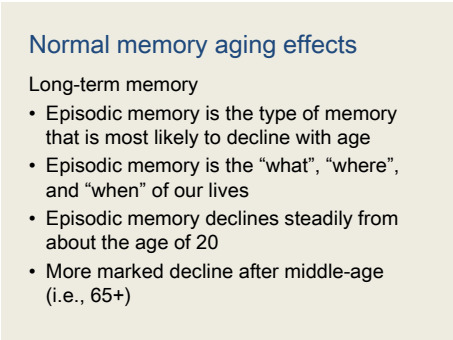

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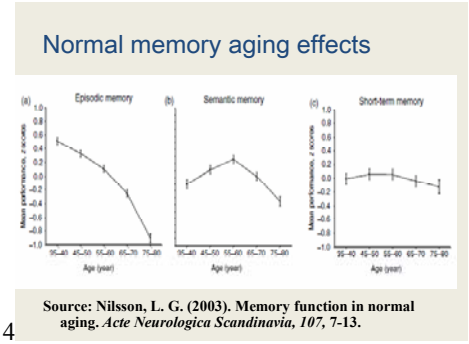

Slide 13: This type of episodic memory is the type of memory that is most likely to decline as you age. Episodic memory, the "what", "where", and "when" of our lives declines steadily from about the age of 20 with a more marked decline occurring after middle-age (i.e., 65+)

Slide 14: So in comparison you can see here that episodic memory declines considerably throughout midlife, (it's part of the reason that older people even without dementia keep asking the same question over and over again). While semantic memory as we heard before peaks at about sixty and may stay the same of drop somewhat, short-term memory remains relatively stable. So that is what you may expect in terms of normal memory changes that occur for most people as they age. We now going to look at memory changes that are not normal, dementias.

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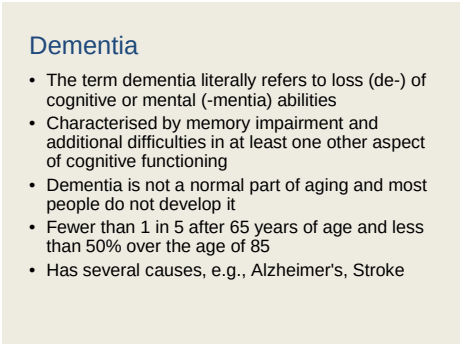

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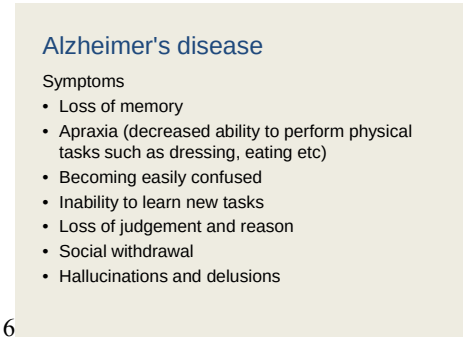
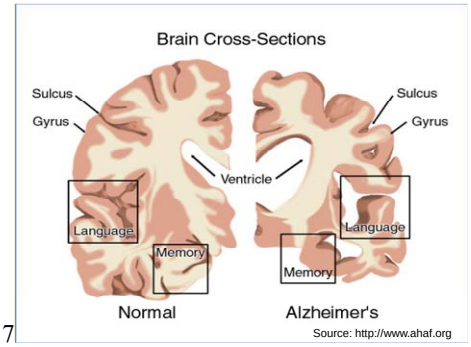


Slide 15: The term dementia literally refers to loss of cognitive or mental abilities. It is a permanent and progressive disease that eventually may render people unable to care for themselves. Dementias are characterized by impairment of memory function and at least one other aspect of cognition such as language, abstract thinking, and reasoning. Besides cognition, dementias may also bring on

losses of motor, emotional, and social functioning as well. Dementia is not a normal part of ageing and most people don't develop it - fewer than 1 in 5 after 65 years of age and less than half older than 85 may develop dementia. Has several causes, e.g., Alzheimer's, Stroke.

Slide 16: Loss of memory, but not the type of forgetting that you experience. Forgetting how to carry out everyday tasks, e.g., handling money, paying bills. Not being able to find way around, or learn new things. Not recalling the names of loved ones. Other symptoms of Alzheimer's disease besides loss of memory, include Apraxia - decreased ability to perform physical tasks such as dressing or eating. Being easily confused, being unable to learn new tasks, loss of judgement and ability to reason, and social withdrawal. Sometimes individuals with Alzheimer's disease may also experience hallucinations and delusions.



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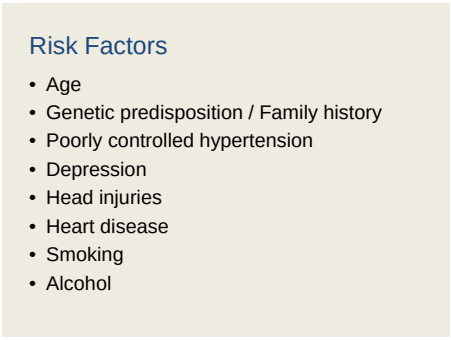

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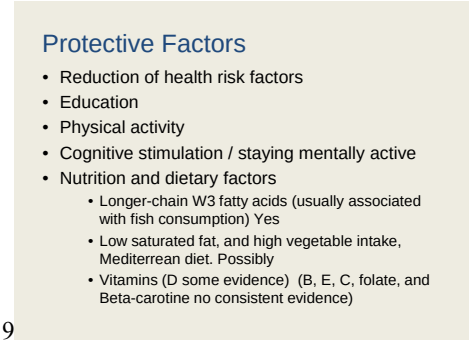
Slide 17: Alzheimer's disease is a progressive disorder in which neurons deteriorate resulting in the loss of cognitive functions. Predominantly affects the cerebral cortex and hippocampus which atrophy as the disease progresses.

Slide 18: These are the main risk factors for developing dementia. The probability of being affected by Alzheimer's disease or any other type of dementia increases with age. Although people with a family history of AD are generally considered to be at heightened risk of developing the disease themselves, many people with a family history never develop the disease, and many without a family history of the disease do get it. In most cases, it is still impossible to predict a specific person's risk of the disorder based on family history alone. Hypertension can lead vascular problems such as strokes which are often the cause of dementia. Those who suffer from depression are at an increased risk to develop dementia and individuals who suffered brain injuries are three times more likely to develop AD. Several recent studies have found that smoking significantly increases the risk of dementia. People who smoke have a higher risk of vascular disease, which may be the underlying causes for the increased dementia risk because of strokes. Studies also have found that drinking large amounts of alcohol appears to increase the risk of dementia. However, other studies have suggested that people who drink moderately have a lower risk of dementia than either those who drink heavily or those who completely abstain from drinking. So a drink every now and then seems to be a protective factor.



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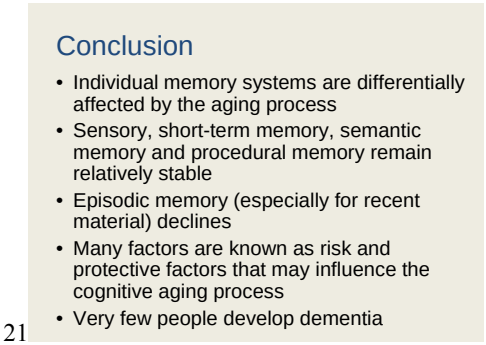
Slide 19: Research has shown that higher levels of education are associated with lower prevalence and later onset of AD. Medical, reduction of conditions listed above. Physical activity is protective. Cognitive activities later in life e.g., clubs, religion, painting and gardening found to be a protective factor with respect to the development of AD. People who report greater levels of mental activity are far less likely to become demented (A recent meta analysis (22 studies) indicates that those who report more cognitive engagement are up to 50% less likely to develop dementia although eevidence is inconsistent). Nutrition and dietary factors. In fact in spite of what the French say… Staying at work longer may have several of these protective factors.

Slide 20: Take Sally for example….



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Slide 21: So…the conclusions for today!! Individual memory systems are differentially affected by the ageing process. While sensory, short-term and especially episodic memory are likely to decline, procedural and semantic memory are known to remain relatively stable. Many factors are known as risk and protective factors that may influence the cognitive ageing process. Very few people develop dementia.

Memory in context:
Health and lifestyle factors that affect memory

There are numerous situations and factors that are known to affect your memory and make you become more forgetful than you normally would be. Knowing what the factors are that negatively impact on your memory will make it easier to avoid them.

These are some of the main factors that are known to affect memory performance:

Sensory limitations: If information is not properly registered by the senses cannot be properly encoded by the memory system. Perceptual abilities (especially eyes and ears) can change dramatically as we age but technology can compensate for this. Auditory and vision test may be necessary to ensure that increasing forgetfulness (and perhaps worrying about it!) is not the result of sensory impairment that can be easily overcome with new spectacles or hearing aids.

Medications: Medication (prescription or over-the-counter) can affect memory performance. Medication may slow processing speed as they make you drowsy or foggy. Attention and concentration processes may also be affected which may further reduce memory functions. Memory difficulties that are due to medication are seldom permanent.

Factors that increase the likelihood of memory difficulties due to medication	Medications that are more likely to affect memory
• Older age • Taking multiple medications at the same time • Increasing or decreasing dosages • Taking medications with alcohol	• Sleeping pills • Anxiety drugs • Antidepressants • Muscle relaxants • Cold medicines • Pain medication

Alcohol: Clearly, alcohol affects the brain. Alcohol can produce memory impairment after only a few drinks and, as the amount of alcohol increases, so does the degree of impairment. Large amounts of alcohol can produce blackouts, or an interval of time for which the intoxicated person cannot recall details of events, or even entire events.

- Long-term abuse of alcohol can lead to irreversible memory problems
- Alcohol use can be the cause of other factors that may negatively affect your memory (i.e., depression and poor nutrition).

Physical exercise and mental stimulation: Research shows that people who engage in physical exercise are more likely to maintain cognitive functioning as they age.
The "Use it or lose it" adage is often applied to cognitive and memory functioning. Keeping mentally active and using one's memory *deliberately* may enhance memory ability. Below are some examples of activities that provide mental stimulations:

- Adult education classes
- Joining clubs
- Arts and crafts
- Gardening
- Religion
- Reading / writing
- Puzzles
- Playing cards
- Sports
- Chess

Physical illnesses / conditions: Memory problems can be a sign that the body is not functioning properly. Physical illnesses can cause memory difficulties that may be temporary or permanent. Some examples of physical states or conditions that may impact on memory are:

- Fatigue
- Thyroid gland dysfunction
- Pain
- Infections
- Amnesia
- Exposure to toxins / chemicals
- Strokes
- Dementias
- Brian tumours
- Head injuries
- Meningitis
- Delirium

Nutrition: A well-balanced diet contributes to overall heath. As brain functioning also critically depends on adequate nutrition, dietary factors are important for cognitive function and may reduce ageing-related cognitive decline. A diet that includes high mono-unsaturated fatty acid has been implicated in healthy cognitive ageing. Mono-unsaturated fats are found in natural foods such as red meat, whole milk products, nuts and high fat fruits such as avocados. High fruit and vegetable intake in general also appear to be associated with protection against cognitive decline.

Dietary factors that protect against ageing-related cognitive decline

- Mono-unsaturated fatty acids (Oily fish such as mackerel, salmon, tuna and herring)
- Vitamins D,B, E, C, folate, and Beta-carotine (spinach, broccoli, asparagus, strawberries, melons, black beans, citrus fruits, soybeans)
- Drink plenty of water to avoid dehydration

Memory in context:
Stress, Mood, Anxiety, and Beliefs

Factors such as stress, low mood, anxiety as well as your understanding about memory and the ageing process can have a profound effect on memory performance.

Stress: Stress is an important determinant of memory performance that cannot be ignored when the goal is to improve memory. Adults who experience a lot of stress report more memory difficulties than people who experience fewer stressors.

Signs and symptoms of stress:

Cognitive	Emotional	Physical	Behavioural
• Inability to concentrate • Poor judgement • Anxiety • Worry	• Moodiness / low mood • Irritability • Feeling agitated • Feeling overwhelmed	• Aches and pains • Nausea • Chest pain • Frequent colds	• Eating more / less • Sleeping more /less • Using alcohol, cigarettes, or drugs to relax • Nervous habits (i.e., nail biting, pacing)

Stressors come in many forms and may also be positive or negative. Stressors may be major or minor. It is important to note that being exposed to a lot of minor stressors may affect memory performance just as much or even more than a single major stressor.

Positive Stressors	Negative Stressors
• Grandchild is born • Planning a wedding • Buying a new car	• Loosing job • Getting divorced • Involved in car crash

Major Stressors	Minor Stressors
• Loss / Grief • Retirement • Major medical procedures • Moving house • Starting a new job • Unemployment	• Loosing keys / wallet • An unexpected high bill • A flat tire • Being late for an appointment • Traffic jam • Having an argument

The ten most stressful life events:

Rank	Event
1	Death of spouse
2	Jail sentence
3	Death of immediate family member
4	Immediate family member attempts suicide
5	Getting into depth beyond means of repayment
6	Period of homelessness (hostel or sleeping rough)
7	Immediate family member seriously ill
8	Unemployment (of head of household)
9	Divorce
10	Break-up of family

Source: Spurgeon, Jackson, & Beach (2001). The Life Events Inventory: Re-scaling based on an occupational sample. *Occupational Medicine, 51* (4), 287-293.

Low Mood / Depression: In general, research has shown that lower mood is associated with higher levels of forgetfulness and faster cognitive decline during the normal ageing process.

Signs and symptoms of low mood / depression:

Cognitive	Emotional	Physical	Behavioural
• Low motivation • Difficulties concentrating • Anxiety / worrying • Difficulties in decision making • Suicidal thoughts	• Depressed / sad mood • Feelings of hopelessness • Feelings of worthlessness • Irritability	• Weight loss / gain • Loss of appetite • Sleep disturbances • Fatigue	• Decreased interest in activities (even those associated with pleasure) • Psychomotor agitation or retardation

Anxiety: Anxiety is characterised by feelings of distress that may be accompanied by physical symptoms and fear. When people experience anxiety, attention is drawn to worrying thoughts and unpleasant experiences such as light-headedness and or feelings of apprehension.

Signs and symptoms of anxiety:

Cognitive	Emotional	Physical	Behavioural
• Nervousness • Difficulties concentrating • Worrying	• Feelings of apprehension • Irritability • Panic spells	• Nausea • Insomnia • Sweating • Dizziness • Light-headedness • Heart pounding • Diarrhoea	• Nervous habits (i.e., nail biting, pacing) • Muscle tension • Tremors • Restlessness

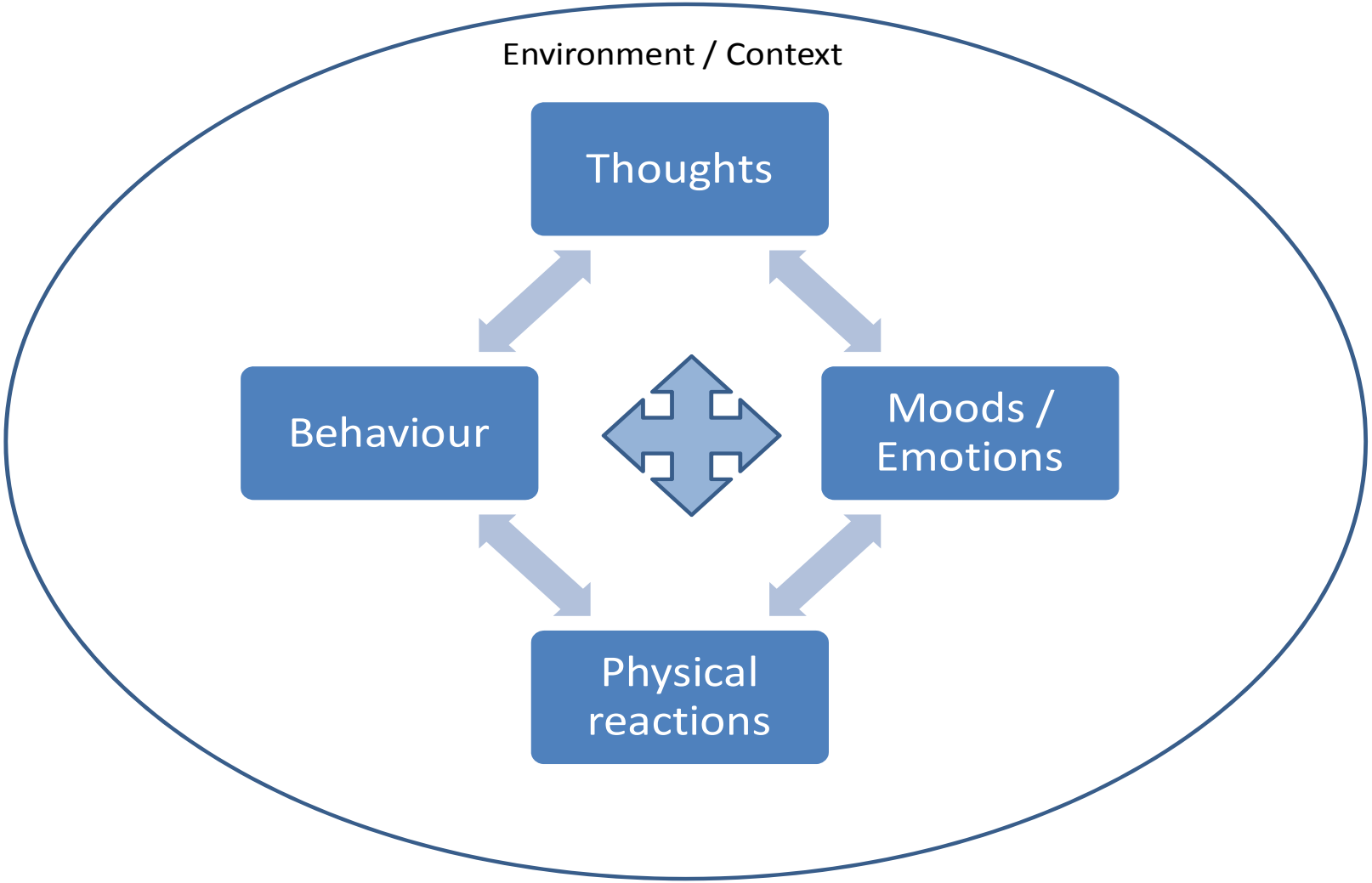
Negative expectations and beliefs about memory and ageing: A popular conception about memory ageing is that organic deterioration in the brain inevitably leads to uncontrollable memory decline. Research has shown that those who buy in to such stereotypical expectation of memory ageing are much more likely to report to be forgetful.

When people expect to fail at memory tasks, that expectation is likely to increase the possibility of memory failure.

Negative attitudes and beliefs about memory and ageing increases the chances that people

- put in less effort into remembering
- become anxious when their memory is challenged
- avoid tasks that require memory
- will not use memory strategies
- will not remember as well as those who have more positive memory beliefs

Five aspects of life experiences



Progressive relaxation

Relaxation is useful for reducing physical and mental tension. Relaxation helps people to: reduce worry and anxiety, improve sleep, and relieve physical symptoms caused by stress (e.g., headaches, stomach pains, diarrhoea or constipation).
If you follow the steps below you will be well on the way to learning how to relax. This exercise should take about 15-20 minutes. However, if you have only 5 minutes to spare, 5 minutes is certainly better than nothing!

1. Find a quite relaxing place: Choose a comfortable chair, or somewhere to lie down, in a place which is free from noise and interruptions.
2. Clear your mind: Focus your attention on your breathing, and try to clear your mind of worries or disturbing thoughts. If these thought drift back into your mind when relaxing, try and focus attention on pleasant, or at least neutral material (e.g., imagining a place where you have felt happy and calm).
3. Practice the slow breathing exercise (described below).
4. Relax your muscles: For each of the muscle groups in your body, tense the muscles for 7-10 seconds, then relax for ten seconds. The muscles should not be so tense that they become uncomfortable or the person gets cramp – but just enough to get the sensation of tightness. Muscles should be relaxed in the following order:
    - Hands – curl hands into fists, then relax
    - Lower arms – bend hand down at the wrist, as though trying to touch the underside of the arm, then relax
    - Upper arms – tighten biceps by bending arm at the elbow, then relax
    - Shoulders – lift shoulders up as if trying to cover ears with them, then relax
    - Neck – stretch neck gently to the left, then forward, then to the right, then to the back in a slow rolling motion, the relax
    - Forehead and scalp – raise eyebrows, then relax
    - Eyes – screw up eyes, then relax
    - Jaw – clench teeth (just to tighten the muscles)), the relax
    - Tongue – press though against the roof of your mouth, the relax
    - Chest – breathe in deeply to inflate your lunges, then breathe out and relax
    - Stomach – push your tummy out to tighten the muscle, then relax
    - Upper back – pull your shoulders forward with your arms at your side, then relax
    - Lower back – while sitting, lean your head and upper back forward, rolling your back in a smooth arc thus tensing the lower back, then relax
    - Buttocks – tighten your buttocks, then relax
    - Thighs – while sitting, push your feed firmly into the floor, then relax
    - Calves – lift your toes of the ground towards your chins, then relax
    - Feet – gently curl your toes down so that they are pressing into the floor, then relax
    - Mentally scan your body for any remaining signs of tension. Repeat muscle tension. Repeat muscle tension and relaxation on any identifies areas.

5. Enjoy the feeling of relaxation
6. Take some deep breaths while you sit still for a few minutes enjoying the feeling of relaxation. During the day, try relaxing specific muscles whenever you notice that they are tense.

Slow breathing exercise

1. Hold your breath and count to five (do not take a deep breath).
2. When you get to five, breath out and say the word ‘relax’ to yourself in a calm soothing manner.
3. Breathe in and out slowly through your nose in a six second cycle. Breathe in for three seconds and out for three seconds. This will produce a breathing rate of 10 breaths per minute. Say the word ‘relax’ to yourself every time you breathe out.
4. At the end of each minute (after 10 breaths) hold your breath again for 5 seconds and then continue breathing using the six second cycle.

Source: Guidelines for Assessing and Treating Anxiety disorders, National Health Committee, 1998

Structured problem solving

Step 1: What is the problem?
Think about and discuss the problem or goal carefully then write down exactly what you belief to be the main problem or goal.

_____
_____
_____
_____

Step 2: List ALL possible solutions for the main problem
Brainstorm and put down all ideas, even ones you think are bad ideas. List all possible solutions without any evaluation of them at this stage.

1)_____
2)_____
3)_____
4)_____
5)_____
6)_____

Step3: Discuss each possible solution
Quickly go down the list of possible solutions and assess the main advantages and disadvantages of each one.

Step 4: Choose the best or most practical solution
Choose the solution that can be carried out most easily with your present resources (time, money, skills etc.)

_____

Step 5: Plan how to carry out the best solution
List the resources and the main obstacles that need to be overcome. Practice difficult steps and make notes of information needed.

Resources needed:_____
Obstacles to overcome:_____

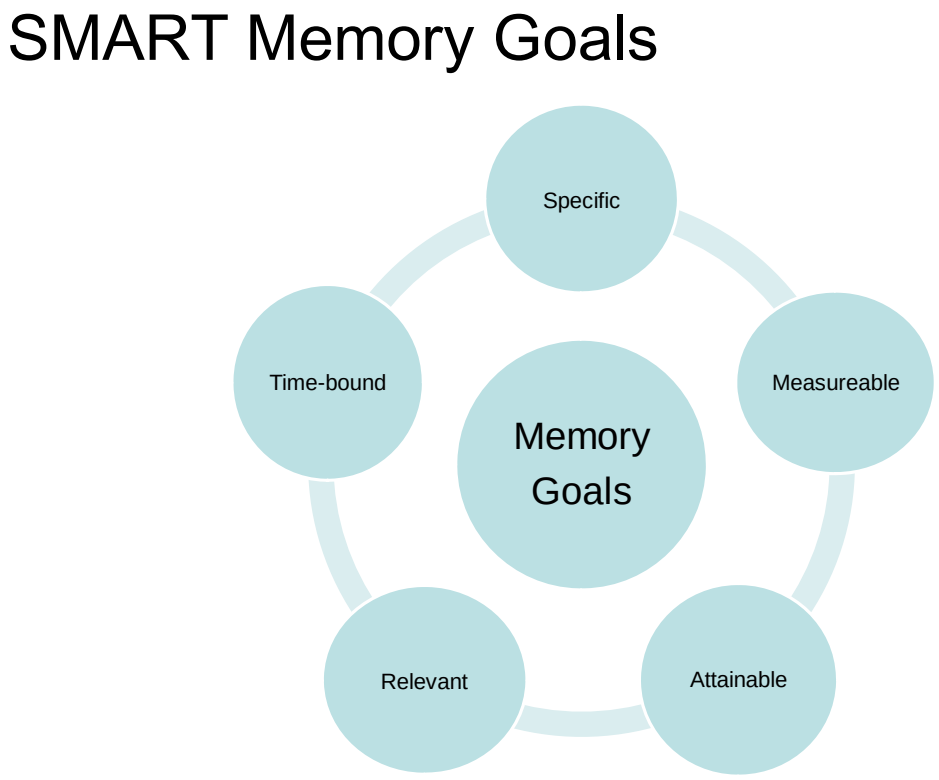
Step 1:_____
Step 2:_____
Step 3:_____
Step 4:_____
Step 6: Implement the solution
Step 7: Review how well the solution was carried out and praise all efforts
Revise your plans if necessary. Continue the problem solving process until you have resolved your stress or achieved your goal.

Source: Guidelines for Assessing and Treating Anxiety disorders, National Health Committee, 1998

Revision and Key Points

Session 1:

Session 1 highlighted that your memory improvement efforts are much more likely to be rewarded if specific goals are set. In your future effort to maintain / improve your memory you be well advised to keep setting goals *before* you tackle the memory failures that bother you. One good way of setting memory goals is to adhere to **SMART** goal criteria:



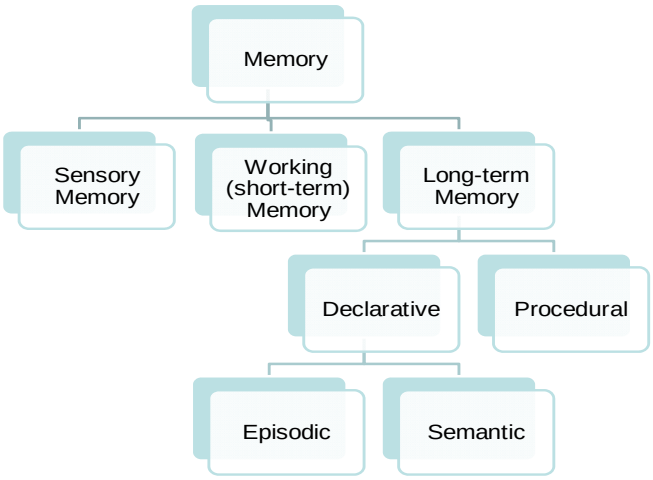
Key points:

- **Keep setting memory goals!**
- **Setting memory goals will greatly increase the chances that you apply memory strategies**
- **Setting memory goals increases performance at memory tasks**

Session 2:

Session 2 was about learning how the memory system and processes interact for memory to occur. Knowing how the system works is an important aspect of memory improvement efforts.

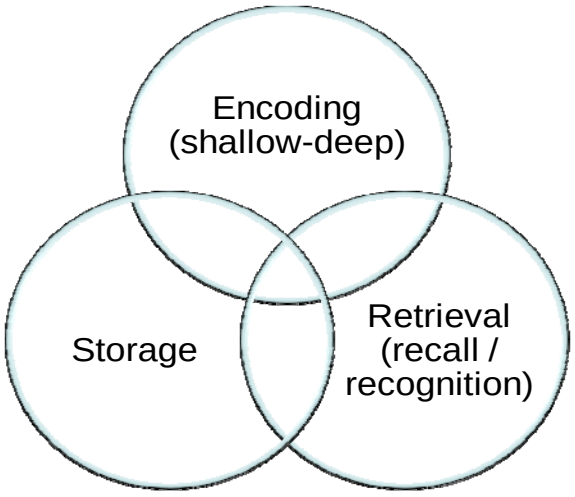
Structure



Processes

Attention

- Sustained
- Focused
- Selective
- Divided

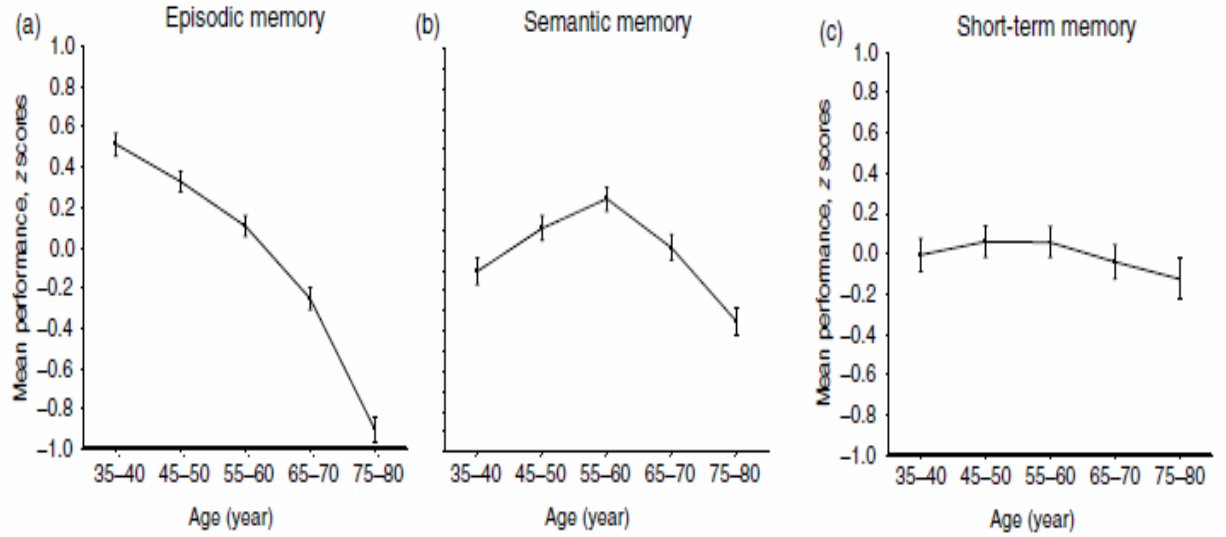


Key points:

- **What seems to be a memory failure may often be a problem related to attention rather than memory**
- **If it is important to remember it's best to pay undivided attention**
- **The deeper the level of processing, the stronger the memory trace**
- **Dividing attention will become more difficult with age**
- **Recognition is easier than recall**

Session 3:

Session 3 addressed the normal and the pathological aspects of memory development that may occur during the ageing process. Knowing that increasing rates of memory failures are a *norma*l result of the ageing process puts your memory failures in perspective.



Source: Nilsson, L. G. (2003). Memory function in normal ageing. ***Acte Neurologica Scandinavia, 107****,* 7-13.

Key points:

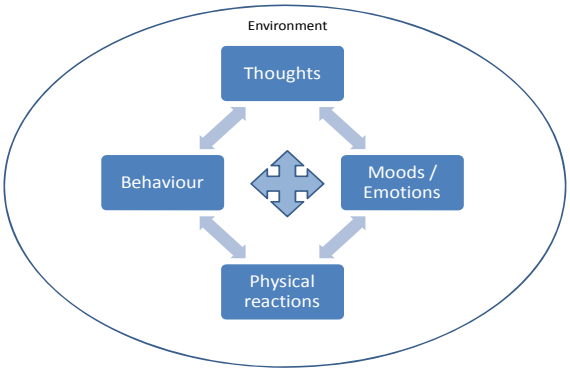
- **Increasing levels of forgetfulness are part of the normal ageing process**
- **Almost everybody in your age-group will experience similar memory failures**
- **There are many risk and protective factors for dementia**

Session 4 and 5:

Session 4 and 5 provided you with a better understanding of the contextual factors that may impact on memory performance.

• Stress	• Sensory limitations
• Mood	• Medications
• Nutrition / diet	• Alcohol
• Beliefs / expectations	• Lack of physical exercise
• Anxiety	• Fatigue
• Mental stimulation	• Physical Illness / conditions

Five aspects of life experience:



Stress and stress reduction:

Stress is an important determinant of memory performance that cannot be ignored when the goal is to improve memory.
Progressive relaxation and structured problem solving are two strategies that may be used to reduce and manage stress.

Key points:

- **Increasing levels of forgetfulness are not always ageing-related**
- **A wide range of factors are known to affect memory**
- **When your memory is not performing to the levels you are used to, take some time and examine whether the above factors may be part of the problem**
- **All life experiences including forgetfulness can be examined in terms of thoughts (beliefs, images), moods / emotions, behaviour, physical reactions, and environment (past and present)**
- **Stress can be eliminated or reduced by strategies such as progressive relaxation or structured problem solving**

Strategies

Throughout the programme we have discussed a number of memory strategies:

- Visualisation
- Method of Loci
- Pegword Method
- Errorless learning
- Chunking
- Stories
- Acronyms
- Acrostics
- Nametures
- Categorising
- PQRRST
- Making notes / using clues
- Memory Diaries
- Organising

When using memory strategies

- Choose a specific target to be remembered
- Review possible strategies and select one
- Try the technique
- If it does not work try a different technique

How can I continue to make progress on my memory goals?

- **Review your memory performance**
  - Keep a list of the things that you forget in your memory diary.
  - Schedule a weekly time to review episodes of forgetting.
  - Then choose specific strategies to reduce specific episodes of forgetting.
  - Revise this process until you find the strategies that work best for the problem at hand.
  - Reward yourself for not forgetting! Have a section in your memory diary of important information that you didn't forget.

- Review the strategy section of the course material and apply a different strategy for a problem. Some strategies work better than others for particular memory lapses.

- Think back to when remembering a particular item or situation was not as difficult. What did you do different in the past that made you remember?

What are my personal "risk factors"?
1. _____
2._____
3. _____
4. _____
5. _____
6. _____

What are the strategies that help me most?
1._____
2. _____
3._____
4. _____
5. _____
6. _____

DRC 16

MASSEY UNIVERSITY
GRADUATE RESEARCH SCHOOL

STATEMENT OF CONTRIBUTION TO DOCTORAL THESIS CONTAINING PUBLICATIONS

(To appear at the end of each thesis chapter/section/appendix submitted as an article/paper or collected as an appendix at the end of the thesis)

We, the candidate and the candidate's Principal Supervisor, certify that all co-authors have consented to their work being included in the thesis and they have accepted the candidate's contribution as indicated below in the *Statement of Originality*.

Name of Candidate: Gunnar Scheibner

Name/Title of Principal Supervisor: Dr Janet Leathem

Name of Published Research Output and full reference:

Scheibner, G. B., & Leathem, J. (2011). Memory control beliefs and everyday forgetfulness in adulthood: The effects of selection, optimization, and compensation strategies, Aging, Neuropsychology, and Cognition, DOI:10.1080/13825585.2011.615905

In which Chapter is the Published Work: Seven

Please indicate either:

- The percentage of the Published Work that was contributed by the candidate: 90

  and / or

- Describe the contribution that the candidate has made to the Published Work:

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Principal Supervisor's signature

20.2.12

Date

GRS Version 3– 16 September 2011