

MEMORY IMPROVEMENT IN THE ELDERLY: VARIABLES TO CONSIDER

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The ageing of the general population implies new challenges and goals for the social and health sciences. It is thus necessary to prepare and strengthen the individual with a view to avoiding risks associated with ageing. This work considers the main hypotheses proposed for explaining memory decline associated with normal ageing, focusing on the influence of attitudinal and motivational variables, such as expectations or attributions, on cognitive performance. The study of these variables provides valuable information for the design of cognitive enhancement programmes for the elderly, as well as indicating which variables should be taken into account in assessing the effectiveness of interventions. Finally, the study proposes a summary of aspects to be worked on in psychological interventions aimed at improving mental functioning (especially in relation to memory) and, indeed, quality of life in the elderly.

Key words: memory, ageing, cognitive training, expectations, attributions.

El envejecimiento de la población plantea nuevos objetivos para las ciencias sociales y de la salud. Se hace necesario prevenir y fortalecer a la persona para alejarla de ciertos riesgos asociados al envejecimiento. Este trabajo presenta una revisión de las principales hipótesis propuestas para explicar el declive de la memoria en el envejecimiento normal, centrándonos especialmente en la influencia de variables actitudinales y motivacionales, como las expectativas o las atribuciones, sobre el rendimiento cognitivo. El estudio de todas estas variables proporciona una importante información para diseñar programas dirigidos a mejorar el rendimiento cognitivo de las personas mayores y nos indica qué variables han de tenerse en cuenta para valorar la efectividad de las intervenciones. Finalmente, se resumen, a modo de propuesta, los principales aspectos a trabajar por las intervenciones psicológicas dirigidas a mejorar el funcionamiento mental (especialmente mnésico) y, en definitiva, la calidad de vida de nuestros mayores.

Palabras clave: memoria, envejecimiento, entrenamiento cognitivo, expectativas, atribuciones.

The ageing of the population is becoming the object of considerable interest and giving great cause for concern as we enter the 21st century. Predictions suggest that the elderly people of the future, as well as representing a substantial percentage of the total population, will present characteristics quite different from those of this generational cohort today: they shall enjoy a better standard of living, they shall have a markedly higher level of education and knowledge, they shall be more participative and they shall have greater awareness of ageing and how to prepare for it (Muñoz, 2002). Thus, the care needs will be quite different from those of today, and professionals will have to familiarize themselves with the new profile of the elderly person. One objective to pursue will be to prepare and strengthen the person for avoiding certain risks associated with ageing, and even to develop intervention routes that permit older people to take advantage of the possibility for growth and gain that the

majority of them conserve (Villar, 2003). This opens up new fields of work, raises new needs and leads to new challenges in the field of the social and health Sciences (Llinás, 2000).

As our society becomes older there is increasing interest in understanding the effects of age on cognitive functioning. Such effects are, primarily, a slowing-down of information processing (Salthouse, 1996), a reduction in attentional capacity (Rogers, 2002; Vega & Bueno, 1995), a decline in some aspects of memory (working memory and episodic memory, especially for recent events) (Fernández-Ballesteros, Moya, Íñiguez & Zamarrón, 1999; Montenegro, Montejo, Reinoso, Andrés & Claver, 1998), and a decline in the executive functions (Andrés & Van der Linden, 2000), though age does not affect all aspects of cognition in the same way, since some capacities, such as semantic processing (Aguilar, Navarro, Llorens & Marchena, 2002), are conserved.

Although a decline with age in some aspects appears inevitable, this tendency can be halted and even reversed through cognitive interventions. Recent years have seen growing acceptance of the notion of cognitive exercise

and training as a form of improving the mental functions, which have shown themselves to be effective in helping to delay the onset of cognitive decline associated with ageing (Goldberg, 2001). The effectiveness of such interventions is based, at a biological level, on reserve brain capacity and neuroplasticity, and at a psychological level, on learning capacity (Montejo, Montenegro & Claver, 2002). On the basis of these premises different programmes have emerged, the majority of them focused on training in memory strategies and techniques (Israel, 1992; Le Poncin, 1992), though some of them also aim to train or stimulate other basic psychological processes (Puig, 2003) and to modify negative attitudes about memory loss (such as the UMAM introduced by the Madrid City Council) (Montejo, Montenegro, Reinoso, De Andrés & Claver, 2001).

In a review of interventions designed to improve cognitive function in adults without cognitive impairment, McDougall (1999) concludes that they should take into account various factors that influence cognitive performance, such as self-efficacy beliefs, and that emphasis should be placed on modifying participants' attitudes about age-related memory decline. Furthermore, this author raises the need to include subjective measures for rating the effectiveness of the interventions. A study by Mas, Jiménez, Munar and Rosselló (2004) reveals the need to consider, in the drawing-up and assessment of cognitive training programmes for the elderly, variables such as perceived performance, self-efficacy expectations, attributions and other factors of a motivational or emotional nature that can influence such people in the performance of cognitive tasks and can affect the rating of their cognitive functioning. Some studies show how a negative view of one's own capacities, of old age and of the changes associated with age can prejudice performance in older people (Lovelace, 1990; Levy, 1996). Negative cultural stereotypes have considerable influence on what older adults think and believe about their own memory, and consequently on their level of effort in memory tasks (Erber, Szuchman & Prager, 1997; Hess, Auman, Colcombe & Rahhal, 2003; Pérez, Peregrina, Justicia & Godoy, 1995; Troyer & Rich, 2002).

Furthermore, Caprio-Prevette and Fry (1996) point to an increase in research on the effects of various cognitive strategies, mnemonic techniques, beliefs about control and social beliefs on memory performance in healthy elderly people. However, there are few studies on the effectiveness of multi-factor cognitive training

programmes that include, in addition to training in memory strategies, interventions in cognitive restructuring and attributional retraining. The evidence in relation to this issue is somewhat contradictory since, although today it seems clear that participant variables have a modulating role in the effects of memory programmes, there are studies indicating that certain interventions on variables of a motivational nature (self-efficacy, attributions, self-esteem, etc.) do not produce memory improvements in elderly people any more than other types of intervention (Reinke, Holmes & Denney, 1981).

All of this suggests the need to explore more closely which variables can influence cognitive performance in general, and memory performance in particular, in elderly people without cognitive impairment. This work sets out to summarize the main hypotheses put forward for explaining memory decline in this population. Although we are not unaware of the importance and abundance of studies carried out with elder adults with cognitive decline or signs of it (e.g., Bäckman, Jones, Berger, Laukka & Small, 2005; Bäckman, Small & Fratiglioni, 2001), our population of interest is elderly people without such impairment, so that research referring to the population with impairment will not be taken into account. Moreover, we should point out that, although numerous variables can influence memory-task performance in older people, we shall focus on work that has studied the influence of motivational-type variables, specifically expectations and attributions. The thorough review of the role of other variables, equally important and the object of recent studies, could be the concern of future work. Finally, we shall propose some of the variables with potential for improvement that should be taken into account in the design of psychological interventions for improving memory in elderly people.

EXPLANATIONS FOR MEMORY DECLINE IN THE ELDERLY

An enormous amount of research has been carried out on how age affects different memory types and processes. Memory decline has been studied taking into account the subject him/herself, the environment and the task. Thus, the field has accepted the validity of different hypotheses explaining memory decline in the elderly from complementary perspectives. *Cognitive psychology* has provided many hypotheses, some of the most prominent among them being those reviewed by Light (1991) and Park (2002).



The first of these authors (Light, 1991) proposes four categories: problems of meta-memory, deficit in semantic coding, problems with deliberate retrieval of information and reduction in processing resources. The last of these hypotheses attempts to explain memory changes with age as a function of a reduction in general processing resources. Three areas have been studied: reduced attentional capacity, reduced working memory capacity, and cognitive slowdown.

It is this context that provides the framework for the second of the reviews mentioned above. According to Park (2002), there are four principal mechanisms proposed for explaining age-related differences in cognitive functioning: the speed of information processing, the functioning of working memory, the inhibitory function and sensory functioning.

Although the hypotheses reviewed do not have conclusive experimental support, they contribute to an understanding of possible causes associated with memory decline with age. In any case, further research is needed to establish the relationship between the different mechanisms explaining cognitive ageing.

But these explanations contributed by cognitive psychology do not consider other variables associated with memory decline in the elderly which, according to other authors, should be taken into account. Thus, for example, according to Berger and Thompson (1998), working from the perspective of *developmental psychology*, deficiencies in cognitive functioning associated with age may be linked to the primary ageing process, and are the result of inevitable neurophysiological and biological changes. In addition, though, certain secondary factors, related to age but not forming part of secondary ageing, may explain some of the cognitive changes in older people. These secondary factors include the poor self-concept elderly people tend to have, the fewer opportunities for learning in old age, and the fact that older people may be unable to demonstrate their intellectual worth –and indeed have no interest in doing so– in some of the ways proposed by psychologists for measuring cognitive functioning. According to these authors, two aspects would play a crucial role in explaining age-related changes:

a) *Changes in the brain*: With age comes a deceleration of the processes of cerebral communication. These become much slower, a change which begins to manifest itself at the end of one's fifties. The slowing-down of the different neuronal processes can be detected through the increasingly lower production of

key neurotransmitters, such as dopamine, glutamate, acetylcholine and serotonin, which enable the communication of nerve impulses from one cell to another. Other brain-related aspects affected by a decrease with age are volume of neuronal liquid, speed of cerebral blood flow and the arousal of various parts of the cortex (Albert & Moss, 1996; Scheibel, 1996). The slowing-down of cerebral communication processes affects cognitive functioning due to a reduction in reaction time, which has consequences for cognitive processing.

b) *Perceptions about one's own cognitive capacity*: A negative view of oneself and of old age can also prejudice the mental capacity of the elderly. For an older adult, one of the main changes associated with ageing is cognitive decline, above all memory loss, which the majority of elderly people admit suffering. The first time people notice such problems they tend to be alarmed, and to ask themselves whether they are becoming senile. And given that cultural stereotypes tend to emphasize memory impairment, even in isolated cases where one forgets a name or where one has left one's glasses, such memory lapses may be seen as bad omens if they are considered to be signs of an increased propensity for forgetting things, or even dementia. Consequently, elderly people tend not to assess the extent of their memory loss accurately, and to consider it, overall, to be much greater than it actually is. This may create in them a loss of confidence which in itself affects memory, and which can deepen if others, on seeing that they are trying to remember something, perceive such doubts as a sign that they have memory problems and act accordingly (Lovelace, 1990).

Berger and Thompson's (1998) conclusion is that it seems evident that negative cultural expectations about the intellectual capacity of the elderly lead them directly to problems of mental rapidity, regardless of the effects of physical changes in the brain associated with ageing. In sum, cultural stereotypes about ageing influence our perception of our cognitive capacities, which in turn affects cognitive performance.

Another, *broader proposal* for explaining the variables involved in memory alterations in the elderly is that of Montejo and cols. (2001), which is summarized in Table 1.

These variables interact differently in each person, and should be taken into account in memory assessments both in individuals and in populational studies. The following



section focuses on the influence of variables of a psychological nature which, according to the literature, may affect cognitive performance in the elderly, namely, expectations and attributions.

MOTIVATIONAL VARIABLES AND MEMORY PERFORMANCE

Age-related differences in memory performance are well documented, and we have seen how a range of studies have focused on identifying the sources of memory decline, especially changes related to age in processing speed and attentional processes. However, in research to date there has been little emphasis on the attitudinal and motivational factors that might contribute to memory decline, though there is evidence that beliefs and attitudes about memory are related to memory-task performance.

Self-efficacy beliefs and memory performance

The area of expectations with respect to memory in elderly people has been mainly studied from the meta-memory perspective, which is related to one of the hypotheses for

explaining age-related memory decline. This concept includes different processes and types of information. A large part of the research on meta-memory in older people has concentrated on beliefs about memory. Specifically, there has been great interest in the concept of the efficacy of one’s own memory, based on the more general notion of personal efficacy proposed by Bandura (1989): the individual’s belief in his or her own ability to mobilize the motivation, the cognitive resources and the course of action necessary for exercising control over the demands of a task.

Efficacy of one’s own memory is defined as the beliefs in one’s own capacity for using memory effectively in various situations (McDougall, 1999). As Cavanaugh (2002) points out, it can be considered, from a constructivist point of view, as a hierarchy of the beliefs each person maintains about him or herself as a memorizer. The hierarchy covers general beliefs, those specific to a field and to a context, and those that are current or relevant to the moment. The efficacy of one’s own memory is considered as a primary influence, though mediated, on performance in three ways (Bandura, 1989; Berry & West, 1993; Cavanaugh & Green, 1990): (a) on the construction and selection of strategies; (b) on the degree of effort and persistence; and (c) on the effect of results on performance. Theories on the adult development of meta-memory postulate a mutual influence between the efficacy of one’s own memory, memory abilities and performance, as well as the need to take into account individual differences (Cavanaugh & Green, 1990; Hertzog, Dixon & Hultsch, 1990).

Diverse studies have shown that older adults believe that they are less competent in memory tasks, that there is a decline after middle age in memory and in cognition and control of cognition, and that they are more forgetful and cognitively slower (Jin, Ryan & Anas, 2001; Lineweaver & Hertzog, 1998; Turner & Pinkston, 1995). Such negative beliefs can lead them to have very low expectations about their functioning, and consequently to reduce the effort devoted to memory tasks (Cavanaugh, Feldman & Hertzog, 1998; Troyer & Rich, 2002).

The majority of research on age-related differences in memory efficacy has focused on personal efficacy beliefs and performance. Results indicate that beliefs about the efficacy of one’s own memory are often inaccurate, and that their correlation with performance is moderate (Cavanaugh, 2002). Studies such as that by Turvey, Schultz, Arndt, Wallace and Hertzog (2000) found that,

TABLE 1 VARIABLES INVOLVED IN MEMORY DETERIORATION IN THE ELDERLY (MONTEJO ET AL., 2001)	
Organic variables	<ul style="list-style-type: none"> - Mild decrease in neuronal volume in the neocortex. - Greater neuronal loss in sub-cortical structures. - Reduction in dendritic connections. - Appearance of neurofibrillary tangles and neuritic plaques. - Reduction in acetylcholine and other neurotransmitters. - Modification of blood circulation in the brain...
Sociodemographic and health variables	<ul style="list-style-type: none"> - Year of education and level attained. - Profession/Occupation. - Level of health and self-perceived health...
Social variables	<ul style="list-style-type: none"> - Social isolation. - Stereotypes. - Environmental demands. - Others...
Psychological variables	<ul style="list-style-type: none"> - Personality. - Mood. - Self-esteem. - Motivation. - Attributional style. - Possible depressive conditions. - Situations of stress. - Subjective perception of the problem. - Others...



although older adults may have negative beliefs about the functioning of their memory, their performance in memory tasks is good. Some studies have even found older adults to have a more positive attitude about age-related memory decline, considering the possibility of the stability of its functioning (Hertzog, 2002). According to McDougall (1999), these findings may be due to a deficient operationalization of memory efficacy or to poor instrumentation. Furthermore, as Cavanaugh (2002) points out, it should be taken into account that the relationship between the two variables is mediated, and varies depending on the type of memory task and the instructions.

As can be seen, the results emerging from studies on the correlation between such complaints and actual performance in memory are not conclusive, and subjective assessments do not correlate in all cases with performance, possibly because complaints about memory are influenced by other factors as well as true performance (mood, emotional stress, perceived health, etc.) (Montejo et al., 2001). However, even taking into account the low predictive validity such complaints may have for memory performance, they are important in view of their implications in the real world, since they contribute to self-awareness and the decision to employ memory strategies. Thus, in the light of the literature reviewed, it can be stated that people's beliefs about their memory, positive or negative, influence their performance, either enhancing it or impairing it.

Finally, we should make reference to the influence of affective and emotional states (such as anxiety or depression) on older adults' beliefs about their memory. The results of diverse studies (Dellefield & McDougall, 1996; Jonker, Smits & Deeg, 1997; McDougall & Kang, 2003; Ponds & Jolles, 1996; Verhaeghen, Geraerts & Marcoen, 2000) show, for example, that, in those with high indices of depression, self-efficacy beliefs in memory are low. On the other hand, authors such as Turvey et al. (2000) found that, although people with depressive symptoms may have negative beliefs about their memory, they can perform well in memory tasks, which indicates that depressive states influence cognitions, but not performance itself. Nevertheless, affective and emotional states should be taken into account, since, on influencing the cognitions associated with memory functioning, they can negatively affect performance in the elderly, given the low expectations and effort in relation to memory to which they lead (Ochoa, Aragón & Caicedo, 2005).

Attributions, memory and age

A range of studies have shown the influence of attributions on memory performance in the elderly, notably those from the groups led by Margie E. Lachman and Christopher Hertzog. Previous research has shown that young and older adults differ in the attributions they make about both other people's memory performance (Erber, Szuchman & Prager, 1997; Guo, Erber & Szuchman, 1999) and their own (Lineweaver & Hertzog, 1998). Previous studies on the attributions people make about others' performance in hypothetical situations show that people tend to make attributions of capacity for low memory performance in elderly people and high performance in young adults (Lachman & McArthur, 1986). Other studies (Bieman-Copland & Ryan, 1998; Erber, Prager, Williams & Caiola, 1996; Rever et al., 1997; Lachman, 1990) have found a tendency to attribute mistakes by older people to internal, stable and uncontrollable factors (such as lack of ability) and those by young adults to external, unstable and controllable factors (such as lack of effort or insufficient attention).

There have also been some studies about attributions for one's own performance. Rating themselves, elderly people make more internal or dispositional attributions for negative results (Blanchard-Fields, 1994; Blanchard-Fields & Abeles, 1996). Lachman et al. (1987) found that attributions to internal factors were related to better performance and more positive self-assessment in a memory task. Moreover, those who did not attribute a favourable performance in memory tasks to themselves were less likely to improve in a subsequent trial (Lachman & McArthur, 1986; Lachman et al., 1987). Other studies have focused on the distinction between controllable and uncontrollable attributions, finding that elderly people tend to make attributions to uncontrollable factors (such as capacity) more than to controllable factors (such as effort or use of strategies) (Baldi & Hertzog, 2000; Devolder & Pressley, 1992). Older people who make internal attributions of capacity perform more poorly in memory tasks than those who make internal attributions of ability or effort (Devolder & Pressley, 1992; Lachman & McArthur, 1986; Lachman et al., 1987).

The works reviewed also show that it is important to distinguish between attributions made for success and for failure. For success, attributions to internal and stable factors can enhance recognition of the value of one's own result and the probability of further success. For failure, the attribution to external and unstable factors can have a



self-protective function. Research suggests that more adaptive attributions (to external and unstable factors) are made for the failures of young people than for those of elderly people (Erber et al., 1996; Lachman & McArthur, 1986). Attributions to controllable factors tend to be considered adaptive despite the performance level, since attribution to controllable causes may be associated with taking responsibility for successful results or with the opportunity to change unsuccessful results in the future by applying more effort or using new strategies (Weiner, 1985).

According to Hertzog, McGuire and Lineweaver (1998), perceived control would be a critical construct for explaining the relations between beliefs, attributions and performance in a memory task. They asserted that elderly people who reported believing they had some control over their memory functioning should, in theory, benefit from such beliefs. They should be more motivated to make an effort to learn, probably using strategies that could compensate for age-related memory deficiencies (Lachman, 1991). Use of the effort strategy for learning material in a memory task involves some implicit belief that memory can be positively affected by something a person does (Lachman et al., 1987). Hertzog, McGuire and Lineweaver (1998) found that elderly people felt less control over their memory than younger people, and that those who felt least control showed more spontaneous use of strategies in a memory task. These authors also found that on controlling the attributions the effect of age on recall was significantly reduced.

For their part, Blatt-Eisengart and Lachman (2004) set out to explore in more depth the differences in patterns of attribution, examining the relationship between attributions, use of strategies and performance in a free recall task with young, middle-aged and elderly people. Their results reveal a relationship between age, attributions and performance in memory tasks. It is noteworthy that, contrary to expectations, they found it more likely for elderly and middle-aged people with poor performance to use more adaptive attributions than younger people. In older and middle-aged people, participants with poorer performance considered internal uncontrollable factors to be less influential than high-performing participants, that is, they used a self-protective pattern. In the case of young people there was no interaction between the attributional pattern and performance, possibly indicating less necessity for protective or self-enhancing attributions for memory in the young.

To summarize, the studies reviewed indicate a relationship between age, attributions and memory performance. As we have seen, elderly people tend to make attributions to uncontrollable factors (such as capacity) more than to controllable factors (such as effort or use of strategies). Furthermore, it is observed that older adults who make internal attributions of capacity perform more poorly than those who make internal attributions of effort. Finally, it should be noted that, according to some research, in the face of poor performance elderly people appear to present a “self-protective” attributional style. All the results discussed suggest the need to continue exploring the relationship between attributions, performance and age, with a view to designing interventions that help older people to preserve their memory functioning on influencing their beliefs about controllable factors such as the use of strategies.

VARIABLES TO BE WORKED ON IN MEMORY IMPROVEMENT PROGRAMMES FOR ELDERLY PEOPLE

Throughout this review we have seen how it is necessary to consider age-related changes at different levels: memory is influenced by all sorts of factors –organic, mental, behavioural and sociocultural. This is so because memory, rather than being isolated, is an active process involving the entire mental system. Therefore, in the design of psychological interventions aimed at memory improvement, we propose that work and assessment should be focused on the following variables:

- 1) Memory strategies and knowledge about memory (meta-memory).
- 2) Basic cognitive processes: perception, attention, language.
- 3) Motivation and emotions: effort, expectations and attributions in relation to performance, negative thoughts about one’s own capacity, stress and anxiety, depression.
- 4) Sociocultural variables: prejudices about age and idealization of youth, isolation and decrease in relations with others.
- 5) General stimulation.
- 6) General health.

It is necessary to design multi-factor programmes aimed at working on the above variables, and for all these aspects to be assessed in order to determine the effectiveness of the interventions. This implies that such programmes should include, in addition to training in



memory strategies and the stimulation of other basic psychological processes, interventions aimed at modifying negative attitudes and beliefs about mental functioning itself and age-related changes that may affect cognitive performance, and at encouraging a more adaptive attributional style in the face of possible memory lapses associated with age. It is also important that these programmes promote an active attitude towards ageing that favours a healthy and stimulating lifestyle at a more general level, since both one's general state of health and the intellectual stimulation one receives have repercussions for cognitive functioning. It is, finally, important for professionals to be aware of the need to work from a multi-factor perspective so as to ensure interventions that are more effective and adapted to the target population.

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