

# Is mental decline inevitable with age



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There is no single reliable way of measuring age, however most gerontologists suggest that 60 to 65 years is the onset of old age. It is stated that at this age; age declines in many physical and psychological processes, and these become apparent, although the actual onset of this decay is usually in early adulthood. There are many suggested causes of physical decline such as “ wear and tear” theories which are parts of the body gradually wear out through use; there is also the cytologic theories, whereby body parts age through exposure to toxins, including metabolic waste products. The disposable soma theory puts forward the idea that ageing may be an evolutionary sound strategy for individual’s genes. As many have argued, deaths from “ old age” are not methods of population control as many have argued.

Physiological ageing typically takes the form of cell loss coupled with loss of efficiency in the cell remaining. A consistent phenomenon is that age related declines are greater for complex than simple processes. The general effect of physical ageing is to provide the brain with poorer support. Perceptual changes in old age can be severe to the point of handicapping many elderly people. For those with less severe loss, the brain is nonetheless receiving a more limited and slower perception of the sensory world. The ageing nervous system also has an impact. There is a substantial loss of central nervous system neurons, and a bad decline in the efficiency of those neurons remaining. Following this, there is also evidence that these losses are tied to declines in psychological performances on perceptual, mnemonic and intellectual tasks.

Processes such as social, biological and psychological ageing do not occur independently of each other. It has been found that changes in the physical state and especially the brain this can have deep effects upon psychological functioning. This is recognized by many pieces of research. Dannefer and Perlmutter (1990) put forward a model that combines the concepts of biological, social and psychological ageing into a single framework. The researchers argues that ageing can be seen in terms of “ physical ontogeny” which is biological ageing; “ environmental habituation” which is the process in which the process of coming to respond to items in the environment automatically such as without conscious attention., and finally “ cognitive generativity” which is where the basic functions are done, so it involves conscious processing about the self and its environment. The ageing process consists of a combination and interaction of these factors. Some researchers suggest that some parts of ageing, such as physical ontogeny are largely beyond volitional control, but that others, and particularly cognitive generativity are what the individual makes of them.

Taking these theories into consideration is can be suggested that the mental ability of humans is affected due to different factors within the brain.

Although whether it is primarily due to age, is questionable. Memory and its effects due to ageing may be explained by looking closely into he functions within the subsections of memory.

Old has been defined as “ the mother of forgetfulness”. Many psychologists state that there are at least three processes or phases in learning and remembering: acquisition or learning, encoding or storage, and recall or retrieval. Acquisition is concerned with acquiring information by means of

one's senses, a process that is more likely to occur if an individual is motivated and attentive. One aspect of acquisition is establishing a sensory impression of the material to be remembered. This sensory memory, lasts only a few seconds, until the impression is registered in short term memory. An example of this is, remembering a telephone number only until you have dialled it. The memory only lasts a few seconds, and then it is gone.

In order to have any chance of being remembered for an extended period of time, the material that is needed to be remembered must get out of the short-term storage and into the long term storage. Long term memory is defined as retention for at least 10 to 20 minutes.

A great deal of research has been conducted in order to understand the link between short term memory and age. Inglis, Ankus & Sykes 1968 took 240 people between the ages of 5 and 70, and they were tested on a rote learning task and a short term memory auditory memory task. On both tasks performance rose until adulthood and then fell in old age. The results of other investigations such as research from Craik 1968, however, indicate that short term memory remains fairly stable and efficient in old aging. It does seem that although short term storage of material shows no appreciable decline, the rate at which such material shows no great recognisable decline, the rate at which such material can be retrieved gets smaller with age.

Our ability to think reason and act in response to incoming stimulation from the environment depends on the integrity of our central nervous system; which consists of the brain and the spinal cord. Changes in the structure and

function of the central nervous system help to explain a variety of the behavioural and performance changes that occur with age.

Whitbourne 1985 suggested some ideas of explaining the loss of brain cells with age. He stated that it may serve overlapping functions when

Certain critical connections between neurons, termed synapses are severed through the loss of certain neurons

Neuronal loss reaches a certain threshold.

Recent research by Selkoe 1991 found that that an isolated group of proteins, called beta amyloids, kill brain cells, and this is very much the case with Alzheimer's disease. These proteins are located in certain areas of the brain and not others. It has also been found that for the form of Alzheimer's disease that occurs before the age of 6, there is a genetic mutation that runs in families.

Dementia and milder forms of loss of mental ability affects millions of older people every year, but the causes are unclear. Previous research using brain scanning has shown that brain shrinkage and changes in the brain's white matter 'wiring', are associated with mental function slowing down in old age. This research adds a new way in which damage to the brain may result in dementia and other mental loss in older people.

The abnormal channels are known as enlarged perivascular spaces. Rare in young, healthy adults, they are very commonly seen in the brain scans of older people, and in conditions such as diabetes, Parkinson's disease, and high blood pressure. Researchers have long noted these abnormalities, but

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until now there has been no research on any links with mental function in old age. The enlarged perivascular spaces might be an indicator of overall brain shrinkage, or they might reflect specific damage to brain tissue around blood vessels.

Over many years there have been many studies into research investigating the effect of cognition and the effects of aging. The most influential research was from Salthouse 1996 he suggested that the cognitive effects of aging can be explained by the speed of processing declining. Salthouse came to this conclusion after doing a number of correlational studies, which do tend to show the best prediction of overall performance in the elderly is provided by measures that depend on speed of processing rather than the processing accuracy or memory performance. Overall Salthouse's research can conclude that it may be possible to account for much influence on age on cognition in terms of a general speed factor.

As people grow older their brain shrinks in size this is shown through the expansion

of the ventricles; the channels in the brain filled by cerebral spinal fluid, which take

up more space as the brain becomes smaller. However, this is not a good measure of

function, as functional change depends crucially on what part of the brain is shrinking.

This tends to be in the frontal lobes, with temporal and occipital lobes shrinking more

slowly. The hippocampus, crucial for memory loses 20-30% of its neurons by the age

of 80 found by Squire 1987, which reflects an initial slow decline, which consequently speeds up the possibly as the result of disease. The electrophysiological

activity of the brain as reflected in event-related potential (ER) measures, slows

steadily throughout the lifespan as Pelosi & Blumhardt 1999 found.

Neschige, Barrett

& Shibasaki 1988 found that with the latency of the P300 component increasing at an

average of 2 milliseconds per year, a rate of slowing that becomes more severe in

dementia.

Studies of brain function using neuroimaging also tend to show age effects.

Cabeza, Prince, Dalselaar, Greenberg, Buddle, Dolcos et al 2004 conducted research on the working memory and visual attention, and observed that older subjects tended to show activation in both cerebral hemispheres on tasks that activate a single hemisphere in young participants. A comparable

result was observed by Maguire and Frith 2003 studied autobiographical memory, with the young showing predominantly left hippocampal involvement, while the involvement of the elderly was bilateral. Reuter-Lorenz 2002 have attributed the broader spread of activation to an attempt by the elderly to compensate for the overload in one component of the brain by utilizing other brain structures.

It is not always the case that greater activation is shown in the elderly, particularly on task where it may be helpful to involve relatively complex strategies. Research by Iidaka, Sadato, Yamada, Murata et al 2001 got participants to remember pairs of related or unrelated pictures. Both young and old showed more left frontal activation for the unrelated pictures, but only the young showed the additional occipito-temporal activation. This area was looked into further by Maguire et al 2003 as it indicates that the active use of visual imagery, in order for it to be activated when using the method of loci, a classic visual-imagery based mnemonic strategy. This method is a very demanding one, and while consistently aiding the young, only 50% of elderly subjects tested by Nyberg, Sandbloom, Jones, Neely et al 2003 found that to benefit from using the method of loci. This appears to be the case; that older participants will attempt to compensate for cognitive decline by using additional strategies, reflected in a wider range of brain activation, however, this might no longer be possible when the task is already complex, potentially inducing reliance on a simpler strategy.

The mental decline within cognition is in the area of intelligence, as people grow older there may be a decline in intelligence. There are effects of aging



on intelligence as measured by intelligence tests, and the differential effects of fluid and crystallised skills.

The most widely accepted theory within intelligence has been the hierarchical approach stated by Cattell 1971. He suggested that all intellectual skills make use of general intellectual ability, but they also call upon more specialised skills, depending upon the needs of the task in hand. Cattell and Horn 1978 identified two of these specialised skills, and called them crystallised intelligence and fluid intelligence. It can be argued that these skills correspond to the popular concepts of “wisdom” and “wit”.

Crystallised intelligence measures the amount of knowledge a person has acquired during their lifetime. It is usually measured by simple direct questions, such as asking the person to define difficult to understand words, or to answer “general knowledge” type questions. These types of questions can only be answered if the person has the information already in their head.

Fluid intelligence on the other hand, draws on acquired knowledge as little as possible, and may be defined as the ability to solve problems for which there are no solutions that can come from formal education or cultural practices.

It could be argued that through exercise and looking after ones well being mental decline can in fact be slowed down to some extent. Research by Hawkins et al 1992 showed that a ten week exercise resulted in a significant improvement in attention tasks, and that in some instances, improvement was disproportionately greater for the elderly group relative to young controls. Also, Powell 1974 found cognitive improvements in elderly institutionalised patients given an exercise regime. There are many reasons

why physical exercise might have a beneficial effect on the intellect. A healthy body is likely to function more efficiently, a healthy body can enhance neural and hence mental functioning. Therefore an older person who feels fit and healthy is also likely to have greater confidence in what they are doing, and therefore have a higher motivation to do well at mental tasks.

The disuse theory is the belief that age-related declines are attributable to a failure to use skills, so that eventually they fall into a decline. The theory is not easy to backup or support. In order to research whether elderly people individual when practising a certain skill less, therefore that level of performance on that skill is lower. Perlmutter & Monty 1989 states that the skill may be worse because of the lack of practice but, equally, the skill could be practiced less because the individual's abilities are worsening, and so he or she has a lower motivation.. However, in research of very well practised individuals on tasks related to a skill they practise regularly, it has almost always been found that there is a decline in performance in older participants. Salthouse 1992 found that airline pilots on spatial skills have shown age related declines which therefore suggest that practice cannot hold off ageing effects.

Although the elderly may be slower and less accurate at some "basic" skills, their experience may be able to compensate for this through greater knowledge of strategies. An example of this was presented by Charness 1981 he demonstrated that this was the case for elderly chess players, which suggests that the level of experience outweighed any intellectual decline.

Rowe and his colleagues have come up with a slightly different set of predictors of good mental functioning in old age. In a recently completed study of 1,300 men and women whose average age was 75 and who had stayed in good health, they found that besides a lifelong habit of intellectual activity, two other predictors of good mental function were physical: getting regular strenuous activity and having good pulmonary function. They also found a psychological factor: having a sense of mastery, a feeling of being in control of what happens in life rather than being at the mercy of circumstance.

It has also been found that it may be possible to slow or even reverse the mental declines that come with aging. Men and women in their 70's were chosen at random from those in his ongoing study for a five-hour training course in spatial orientation and inductive reasoning, the abilities in which men and women respectively show the largest drops in those years. The coaching in spatial orientation included tips on how to read a road map, and in inductive reasoning, how to recognize rules of thumb helpful in practical decision-making, like knowing from a timetable what train to take.

About 40 percent of those who took the tutorial had an increase in their scores to levels they had had 14 years before, in their early 60's. Seven years later, as the group entered their 80's, the five hours of tutoring still showed surprisingly strong effects, slowing mental declines. Those tutored were at the same levels as seven years earlier, just before the first coaching.

Overall, it could be argued that mental decline is inevitable in some cases of research. Theories that derive from the aging brain support the idea that the

decline is inevitable as the brain shrinks with age, causing a cognitive decline. Also, research supporting this decline being inevitable is shown through diseases such as dementia occurring when people are at an older age and not when young suggesting that a decline in mental abilities does decline therefore leading to such diseases. There is also a huge number of supportive evidence supporting this case. However, there is also evidence that states that mental decline is not inevitable and that it can in fact be reversed in some cases through exercise and the process can be slowed down through such exercises. Therefore, it is difficult to say whether there is a definite inevitable decline with age. A possible way to investigate the validity of this case could be to research larger groups of people and take into account every factor that the person holds, in order to help eliminate individual differences and help reduce them to the minimum. Although to reduce them completely is not possible as individual differences will always be around and hard to pin point the cause and effects of relations.