



MEMORY IN LATER LIFE AND HOW TO MAKE THE MOST OF IT

On June 9th 2014 in Lancaster, the Association for Education and Ageing (AEA) held a conference entitled “Memory in Later Life and How to Make the Most of It”. It was organised and chaired by Professor Keith Percy of Lancaster University and the AEA to mark the end of the successful two year European project - ‘*Memory in Later Life – learning, supporting, developing*’ - an EU Grundtvig learning programme in which the AEA was the United Kingdom participant. 63 people attended the conference, including members of the AEA, of Lancaster University’s Continuing Learning Group and of the University of the Third Age; academics and researchers; professionals from the caring, health and adult education professions; and team members of the Grundtvig project from Germany, Greece, Hungary, Italy, Poland and the United Kingdom.

Apart from discussion of the European project, there were three keynote addresses in the conference:

Unlocking the Mystery of Memory

Dr. Val. Bissland, Centre for Lifelong Learning,
University of Strathclyde

**What aspects of memory really matter in
maintaining quality of life in older age and
what can we do to prevent or delay changes?**

Dr. Carol Holland, Director of the Centre for
Healthy Ageing, Aston University

**The effects of healthy ageing on visual
working memory and attention**

Dr Louise Brown, School of Psychological
Sciences and Health, University of Strathclyde

At the end of the conference, members of the audience asked for a summary record of the three addresses. The keynote speakers collaborated in producing the attached document.

<http://www.associationforeducationandageing.org/>



Memory in later life and how to make the most of it

By Val Bissland, Carol Holland and Louise Brown

AEA member Dr Val Bissland, psychology tutor in Glasgow's Learning in Later Life programme (University of Strathclyde) and also a participant in the Grundtvig Project, ran the interactive morning session called '**Unlocking the Mystery of Memory**'. This addressed the neurobiology of memory – what we know about how memories are formed, how they are stored and why some memories are easier to recall than others. Val showed a number of film clips that addressed these issues and began with a humorous spoof of Sarah Palin making a complete mess of a book promotion on improving memory. It made the point that humour reduces stress hormones, and increases the release of endorphins which are wonderful memory improvers!

Brain circuits and plasticity

In order to illustrate the amazing way brain cells communicate Val used colourful illustrations and video simulations of brain cells firing. These demonstrated that remembering is a physical process involving electrical zaps and chemical flow between the 100 billion neurons that populate our brains. Through watching a film of Norman Doidge, psychiatrist and author of "The Brain that Changes Itself", the attendees heard the amazing story of the 60 year old man who learned to walk again after a major stroke, although most of the brain cells in his motor cortex had been destroyed. This illustrated the plasticity of the human brain throughout life and how it can respond to experience and rewire itself using undamaged circuits, if the person can make the effort.

The gateway to memory

Regarding adult learning, Val quoted the psychologist David Ausubel – "The most important single factor influencing learning is what the learner already knows." Our knowledge is stored in our long-term memory in different areas in the brain. We know this because, with brain scanners, neuroscientists can watch different areas lighting up as the person performs different tasks. The key organ for memory is the hippocampus which lies deep within the brain, and it is sometimes referred to as the 'gateway to memory'. When we learn something new it will be forgotten unless we link it to knowledge already stored. The hippocampus is vital for recording new information and from there it can migrate to other storage sites in the brain. With severe damage to the hippocampus there is little possibility of new long-term memories forming. However, old skills can remain intact because they have become unconscious habits, well established in existing brain circuits.

Cells that fire together, wire together

We also learn best when in a positive emotional state, as 'happiness' chemicals, such as dopamine and serotonin, create stronger cell connections. Good feelings, together with associations to things we know or have experienced, create more permanent, more easily

recalled memories. In other words “Cells that fire together, wire together”, and help to make retrieval of words, ideas and facts less of a problem. Indeed words, sounds, pictures and positive feelings all combine to make new learning more pleasurable and more memorable. Set this in the context of a brain that has a good supply of oxygen (through exercise), nutrients (through good diet) and an optimistic outlook (through social support) and it is a formula for building a robust memory.

This set the scene for the first afternoon presentation entitled **‘What aspects of memory really matter in maintaining quality of life in older age, and what can we do to prevent or delay changes?’** Dr Carol Holland, Director of the Aston Research Centre for Healthy Ageing, Aston University (Birmingham) set out evidence on the effects of physical, intellectual and social activity on cognitive function and memory.

The impact of exercise

Carol showed some of the groundbreaking research that is changing perceptions about the inevitability of decline in older age and in dementias. In these studies a normal range of older people were assigned at random to physical exercise groups or control groups, and any changes in intellectual functions observed. She introduced the concept of “executive function” as a component of thinking. This is not quite the same as what we think of as memory, but it affects what we pay attention to, our planning ability, being able to switch concentration between tasks, or avoid being distracted. In the research, physical exercise was shown to have a significant influence on executive function as well as memory, and Carol showed some brain images from older participants that demonstrate clear increases in grey and white matter (that is, in the neurons and their connections) as a result of exercise. Some of these studies even show delay of disease progression or improvements in people with dementia. Carol pointed out how very encouraging this is.

Some evidence from long-term research was also highlighted: for every day that people report that they have done intellectually challenging activity, it delays end-of-life serious cognitive decline by another 0.18 days! In addition, social engagement also appears to have a beneficial effect on stress or depressive symptoms, and improves intellectual function.

Autobiographical memory

Given all we know about the impact of an active and engaged lifestyle on maintaining intellect, it is important to investigate factors that may affect our ability to become friends and stay involved with others and our hobbies and social opportunities. Carol explained why ability to recall autobiographical memories in a specific and detailed fashion is so important to our wellbeing and to maintaining good relationships. These are sociable aspects of memory - details from our life history that often embed important feelings.

A specific study of people who were moving into supported living environments was discussed. It investigated the idea that ability to recall autobiographical memories is a function of memory

that lies between two dimensions - on the one hand, normal intellectual abilities or depression and, on the other, actual limitations in our abilities to engage in activities or actual measures of our maintenance of independence. The study showed that this sociable aspect of memory does indeed mediate a number of important aspects of living - thinking skills, underlying depression, perception of own health or independence. Autobiographical memory was shown to improve once people settled into an active and sociable community.

The audience at Lancaster discussed ways of improving their memory for personal events and also discussed issues like normal variation in intellectual function, background education and the effect of later life learning. Evidence on prevention or delay of dementia, even in the context of genetic predispositions, was also discussed. People were heartened to know of the steps they could take to maintain their executive function and improve their autobiographical memory in later life.

The final presentation concentrated on another important aspect of memory - **short-term or “working” memory**. Dr. Louise Brown, School of Psychological Sciences and Health, University of Strathclyde asked whether the members of the audience recognised the all-too-common problem of walking into a room and forgetting what they had gone in for. This was a prime example of a working memory failure – an annoying one that we all experience, which also tends to increase with age. Working memory guides moment-to-moment functioning but has limited capacity. So if we do not attend to what we wish to keep in mind, perhaps due to other distractions, then the information can easily be lost.

Visual Working Memory

Louise’s research focuses in particular upon furthering our understanding of visual working memory performance. This research, along with the research of others, supports the idea that, on average, visual working memory performance begins to decline from our early 20s. Some of Louise’s research has shown that cognitive processing speed may play a role in this; brain signals tend not spread less quickly with age. Louise’s research has also shown that everyone benefits from the opportunity to attach meaning to otherwise quite abstract visual information such as black and white chequered patterns. For example, if you notice a shape within the pattern that you think resembles something you have come across before, like a particular object or animal, then you are more likely to be able to reproduce the overall pattern some moments later. Effectively, in this circumstance, you are benefiting from being able to draw upon your long-term memory resources. However, older adults may benefit from this kind of strategy even more than younger people. This new research is currently being followed up, as observations of improvements in people’s working memory performance is always exciting for researchers.

Associative Memory

Louise also outlined her research that focuses upon associative memory. Previous research has

shown, for example, that older people tend to be quite good at learning individual faces or names, but that they are not quite as good when trying to remembering exactly which face goes with which name - that is, creating associations in memory. Louise is applying this theory, within her visual working memory research, to investigate how older people can create colour-shape associations (“bindings”) in working memory. Promisingly, healthy older people are relatively good at creating these sorts of associations. Other researchers have shown, by contrast, that people with Alzheimer’s disease have a marked deficit in this sort of processing. This research is therefore helping us to understand the differences between healthy and pathological ageing processes and the underlying cognitive processes that are involved.

Lifestyle aspects of maintaining a good memory

Finally, Louise reiterated Val and Carol’s points about the benefits of a healthy lifestyle for cognitive functioning in later life. She noted that it is important to keep mentally and physically active, as well as to keep on a healthy diet, including a variety of fruit and vegetables. For example, compounds in black grapes and blueberries, and also oily fish, may help healthy brain cell functioning. Note that the government recommends consuming two portions of oily fish per week, as oily fish contains healthy omega-3 fatty acids. Moreover, social interaction is also very important in older age and research has shown that engaging in volunteer activity for just two hours per week is positively related with health and wellbeing. Notably, volunteering involves more physical and mental activity, as well as more social interaction.

Postscript

Although each presentation approached memory in later life from a different angle, all speakers emphasized the importance of a healthy and social lifestyle, which can make a significant contribution to a healthy brain and build up its resilience to deficits as we grow older - sometimes referred to as building ‘cognitive reserve’. All agreed that it is never too early or too late to start!

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