Immersive Memory – Neuroscience, 3D Worlds and the Ancient Art of the Memory Palace.

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1   The Memory Palace

The Memory Palace, or 'Method of Loci' was a mnemonic system developed in ancient Greece and Rome, and later perfected throughout the medieval and early Renaissance period until the invention of print mean that people no longer had to commit large amounts of information to memory. At its simplest the method involves using real or imaginary architecture into which the user places exaggerated images to represent objects or concepts they want to remember. Following the arrival of the printing press the Memory Palace became absorbed into the quasi-mystical underground world of the Hermeticists and linked with cabbalistic wisdom pursued by alchemists, astrologers and philosophers such as Ramon Lull and Giordano Bruno.[1]

In addition to this 'Method of Loci', other similar associative mnemonic systems have been developed throughout the Enlightenment to the present day, such as the Major System in which words and sentences are built from numbers, and the Dominic System, which uses people and actions to create images for the digits 0 to 9999. By combining these systems stage magicians perform astounding feats of memorization, professional card players work the blackjack tables at casinos and memory experts compete in the World Memory Championships.

Despite the triumphalist claims of some of its proponents, and a smattering of self-help books that offer up these memorization techniques as ways to boost brain power and unlock latent genius, the Memory Palace has failed to gain traction in mainstream culture. There are a number of possible reasons for this.

To begin with it is assumed to be a method designed to memorize large numbers of facts, an activity now associated with a very narrow, traditional approach to education focussed on regurgitating knowledge in summative exams. This criticism isn't helped by the tendency of memory champions to display their prowess by such pointless feats as recalling randomly shuffled packs of cards, the contents of telephone directories and Pi to hundreds of digits.

Secondly the claim that the Memory Palace allows the user to swiftly and effortlessly store and recall knowledge is not strictly true. Building, populating and maintaining such mental architecture can demand as much effort and practice as simple rote memorisation, leading to the inevitable conclusion that you might as well expend the energy on the latter than waste time on the former.

Finally, other than recalling phone numbers, shopping lists and historical dates, there has been little progress in exploring the potential of the Memory Palace

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[1] Yates, Francis, The Art of Memory, (Chicago: The University of Chicago Press, 1966), p 229.

as a cognitive device, to determine whether it can be used for more complex mental tasks such as analysis, abstraction and theorisation. Yet it's clear that early practitioners, such as St Augustine and the Jesuit adventurer Matteo Ricci, saw it as the vehicle for complex reasoning, and not just as a data store.

Neuroscience and the Nature of Memory

Recent research in Neuroscience, especially with the growth of fMRI imaging, has provided an interesting counterpoint to the principles of the Memory Palace. While some of the mechanisms of memory identified in studies of the brain support the methodology, others point to innate barriers or natural cognitive processes that counter-act or impede it.

At a biological level long-term memory is created when regularly used synaptic gaps fuse to create permanent links between brain cells. Furthermore, memories are coded as complex patterns, known as engrams, which over time are linked together, merged and simplified.[2] Essentially the mind associates any new experience, concept or piece of information with what is already in its memory.

This echoes the process of creating an image of the thing to be remembered and placing it within the permanent imaginary architecture of the palace. The mnemonic technique differs from automatic memory by creating association through a process of metacognition, rather than letting the connections be created by chance. In addition, as the simple act of thinking about something strengthens the connections between cells, so the process of practice and recall, whereby the user 'walks' through their palace and examines each mnemonic object in turn, consolidates knowledge.

However, a recently discovered feature of memory causes issues with the specific nature of palace imagery. Over time, as memory and experience accrues, the brain will merge engrams, so that similar patterns combine into a single uber-memory. This is the result of the mind's drive for efficiency and minimum energy usage. The process of consciously thinking about memories appears to accelerate this process, so that every time we remember something, we change it and, in doing so, subsume it into a large web of associative concepts. In addition, memory is only granular down to a certain level, which is why it is often difficult to recall objects and people in photographic detail. The fact that our memories are slightly out of focus, and become absorbed into combined recollections, means that the Memory Palace is in danger of falling victim to a form of mental entropy. This is why it needs regular review and significant mental effort to maintain.

Virtual Reality, Immersion and 3D Worlds

The increasing sophistication of VR, and 3D worlds suggest new possibilities for the development of the Memory Palace. The most immediate and obvious being the ability to create virtual architecture through the use of programmes like Minecraft and SketchUp. As long as there's functionality within the software for walkthroughs then it's possible to recreate mnemonic locations, and to even go as far as building the images used to prompt memory.

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[2] "Portrait of a Memory", Shen, Helen, Scientific American Mind, May 2018.

By incorporating VR, we can go one step further and actually journey through a Memory Palace in full 3D. However, the amount of work involved in creating such an environment would be significant and once again begs the question as to whether the time would be better spent memorising the content directly. On the other hand, a simple program like Minecraft allows the user to quickly create a simplified and abstracted version of the Memory Palace, roughing out the architecture and letting the imagination fill in the detail. This can then act as a powerful prompt and provide a more stable spatial reference than the mind, which often seeks to compress and simplify space to reduce effort and conserve energy (i.e. it's much easier to 'jump' from one imaginary location to the other than imagine the process of walking in real time). Another alternative is to use pre-built worlds from games, especially walking games like Myst and, more recently, Dear Esther.

While computer generated Memory Palaces can be used to enhance practice, they also place yet another symbolic layer on top of the process of recall and understanding. In the traditional methodology the builder transforms a concept into a symbol and places it within imaginary architecture. Recalling the content means unscrambling the rebus to get at the original. By adding a virtual world as a 3D map of the mental landscape, a further step is added to the decoding process so that the memoriser has to read the VR space to recreate the architecture in the mind before tackling the symbolic images.

Memory Palaces are deeply personal. Indeed, they work best when the architecture and content is linked to the unique experiences, knowledge and memories of the individual. Symbols built from ideas that are significant to the creator are far more powerful than pre-made mnemonics. For this reason, Memory Palaces do not travel, meaning that multi-user versions, or 3D worlds fashioned as aids to other people are of little added value.

Ultimately it would appear that the Memory Palace does enhance cognition through the mind's ability to create immersive imaginary environments in which concepts and information can be consciously inserted into the webs of association in our brains. Journeying through such architecture, revisiting ideas as far as the natural limitations of memory allow, supports the reinforcement of connections between neurons. 3D worlds created in sandbox programmes, or appropriated from walking games, can make the recall process easier, in the same way a finger running along a sentence aids reading, but they add an additional symbolic layer to the process. Further research and experimentation is needed to understand the extent to which immersive computer-generated experiences can support or hinder practitioners of the System of Loci, and to understand the whether it can be used to facilitate abstract reasoning as well as the memorisation of information.