

Summary of Sleep Memory project

When we try to remember something, how easy it seems to depend on several things: how well it fits with our existing knowledge, how good our usually memory is, and even how well we slept the previous night. This project is concerned with looking at how these three things are related to each other.

Remembering something involves initially storing it, later retrieving it and in between strengthening the memory and integrating it into our existing knowledge. How quickly and easily a memory is strengthened depends in part on how easily it is integrated into our existing knowledge. For example, if you were brought up to listening to Western pop music and hear a new pop song that you like, the chances are you will be able to remember it quite easily. If instead you had hear a piece of Indian classical music, you will have a much harder time remembering it. If you had been brought up listening to Indian classical music instead, the reverse would be true. We develop these knowledge frameworks from experience and they help us to remember and make sense of things.

Sleeping also helps to strengthen our memory. We know that if we sleep after learning something new, not only are we more likely to remember it again the following day, but it will also be better integrated with our existing knowledge. These two things - sleep and existing knowledge frameworks - may therefore be connected in some way. We have different types of sleep during the night, including our deepest sleep mostly in the first half of the night, and rapid eye-movement (REM) sleep mostly in the second half of the night, when we have our most vivid dreams. One theory suggests that the amount of REM sleep we get is related to how well easily integrated memories are strengthened over time, while the amount of deep sleep is related to how well other memories are strengthened. This theory also suggests that an area near the front of our brain is particularly important for strengthening easily integrated memories, while a different area helps to strengthen other memories.

We will test this theory by asking people do one of two things. Some people will listen to songs, some of which fit well with their existing knowledge and some of which do not. Others will watch movies with typical storylines but some of which will be scrambled to confound expectations. In both cases, some songs or movies will be learned on the first day of the study, and some more will be learned on the second day. In between, we will monitor overnight sleep in order to see if the amount of REM sleep is related to how well the more easily integrated songs/movies are remembered. We will also monitor brain activity while the songs/movies are being heard/watched and later recalled, in order to see which brain areas are involved for the different types of memory.

Our memory tends to fade as we get older. One reason for this may be that we get much less deep sleep as we get older. That may mean that some types of memory which are not as dependent on deep sleep - including memory that integrates well with existing knowledge - may not fade as much or even at all. Our project will look at whether or not this is the case by using the songs/movies tasks with both healthy younger and older adults. Finding forms of memory which are well preserved in older adults is a key step in developing techniques to help cope with memory loss.