University of Leicester School of Psychology

Project title: Executive functions and hierarchical organisation in short-term memory for spatial locations.

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Non-technical summary

We are continuously faced with the problem of having to perform sequences of movements in the space around us. When searching for a particular object, such as our house keys, we need to keep track of the places where we look to avoid going back to places that we have already unsuccessfully explored. These abilities are supported by temporary spatial memory. Psychologists use a particular test, the Corsi Tapping Test, to measure spatial memory in experiments with healthy people and to measure memory problems in people that have suffered brain injuries. In this test people observe the tester tapping onto a set of wooden blocks and then try to imitate the sequence that they have just observed. In the standard version of the Corsi test the arrangement of the blocks in space is relatively diffuse and it is commonly assumed that when remembering the sequences that they have to repeat, people remember each location independently from the others and that the specific arrangement of the blocks should not play an important role in their ability to reproduce the sequences. However, some studies have shown that when the blocks are arranged in spatial groups, people remember better sequences that explore each group in turn. By contrast sequences where blocks in different groups are tapped in succession are more difficult to remember. It is possible that people psychologically group the blocks in their memory. Therefore people would not remember the blocks individually but will remember the order in which the groups have been explored and then, within each group they will have a separate representation of the order in which each individual block has to be tapped. This hypothesis would be important as in other types of memory, such as memory for lists of words, particular brain functions, often associated with the working of the anterior parts of the brain, the frontal lobes, are responsible for using the meaning of words to group them in categories and this helps in remembering the list. It could be possible that similar functions operate in spatial memory as well. This study will investigate this hypothesis. It has two main aims. The first is to assess if frontal functions are involved in producing the facilitation that people experience in remembering sequences of spatially grouped spatial locations. The second is to evaluate if the way in which people remember spatially grouped sequences is based on a representation that stores at two

different, and relatively independent levels, the order in which each group of locations has been explored and the order in which each block is explored within each group.