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The Limits of Memory: We Can Only Remember Four Things at a Time

New research in to our minds capabilities to retain knowledge has shed light on a question that has been discussed for many years; how much, can our mind remember, at a time?

The study focused on 'working memory', that part of our mind which refers to the temporary storage of information that still allows us to pay attention and manipulate it. Some believe that working memory is separate to any of our other memory storages, many believe that working memory is simply that part of our long-term memory that we can currently access.

Research originally suggested that our working memory cut off point was around the seven items mark. However scientists are revising that idea, when adding the limitation of no memory tricks, such as repeating items over and over or grouping them together. Telephone numbers are a good way of looking at what scientists are referring to here. For example, Microsoft's Corporate HQ telephone number is 800 642 7676. At first blush, remembering that number would suggest the ability to remember 7 or more items. However considering the blocking – 800 + 642 + 7676 – and the repetitive nature of the number, one cannot be so certain.

"For example, when we present phone numbers, we present them in groups of three and four, which helps us to remember the list," said University of Missouri-Columbia psychologist Nelson Cowan, who co-led the study with colleagues Jeff Rouder and Richard Morey. "That inflates the estimate. We believe we're approaching the estimate that you get when you cannot group. There is some controversy over what the real limit is, but more and more I've found people are accepting this kind of limit."

The study had to take a new method in testing this revised theory, given the problems presented with numbers or letters. Thus, subjects in the study were presented with an array of different colored squares. The subjects were then shown an array of the same squares, but this time without the colors. Finally, they were shown a single colored square in one location, and asked whether

the color matched that of the square in the same position at the beginning of the test.

"What's nice about this visual task that they used is that it really makes it difficult to use some of those common strategies that are helpful with verbal lists," said Michael Kane, a psychologist at the University of North Carolina at Greensboro, who was not involved in the new study. "I think Cowan's work has really been convincing in this."

This new method does build upon previous research, but it allows for the most rigorous mathematical test of the three-to-four memory ability.

Backing up the revised testing method was a computer model, programmed to assume that humans have a fixed number of memory slots in their working memory bank. Programmed to believe that each slot could only contain one piece of information, when the slots were filled, the model predicted that people would begin making random guesses. Subsequently, the model was able to predict with a surprising level of accuracy the results of the trials.

"It is a pretty simple mathematical model but it predicted a very exquisite pattern of data," Cowan said, speaking to LiveScience.

"The results really were simple. With a single value of working memory capacity we could really account for all those different scenarios."

Naturally, there is a variation amongst some individuals, but the average cap does seem to hover around the 3 or 4 memory slot mark. Interestingly though, those individuals that have a higher level of working memory often do well at learning, reading comprehension and problem solving.

"People accept that intelligence seems to be related to working memory," Cowan said. "The information you can hold in your mind at one time is the information you can interrelate. If you have a better working memory we believe that your problem-solving abilities are better."

Posted by Josh Hill.

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