

20. People Remember Only Four Items at Once

If you're familiar with usability, psychology, or memory research, you've probably heard the phrase "the magical number seven, plus or minus two." This refers, actually, to what I would call an urban legend: George A. Miller ([1956](#)) wrote a research paper showing that people can remember from five to nine (seven plus or minus two) things, and that people can process seven plus or minus two pieces of information at a time. So you should only put five to nine items on a menu, or have five to nine tabs on a screen. Have you heard that story? Well, it's not quite accurate.

Why It's an Urban Legend

Psychologist Alan Baddeley questioned the seven plus or minus two rule. Baddeley ([1994](#)) dug up Miller's paper and discovered that it wasn't a paper describing actual research; it was a talk that Miller gave at a professional meeting. And it was basically Miller thinking out loud about whether there is some kind of inherent limit to the amount of information that people can process at a time.

Baddeley ([1986](#)) conducted a long series of studies on human memory and information processing. Others, including Nelson Cowan ([2001](#)), followed in his footsteps. The research now shows that the "magical" number is four.

Using Chunks to Turn Four Into More

People can hold three or four things in working memory as long as they aren't distracted and their processing of the information is not interfered with.

One of the interesting strategies people employ to help our fragile memories is "chunking" information together into groups. It's no accident that U.S. phone numbers look like this:

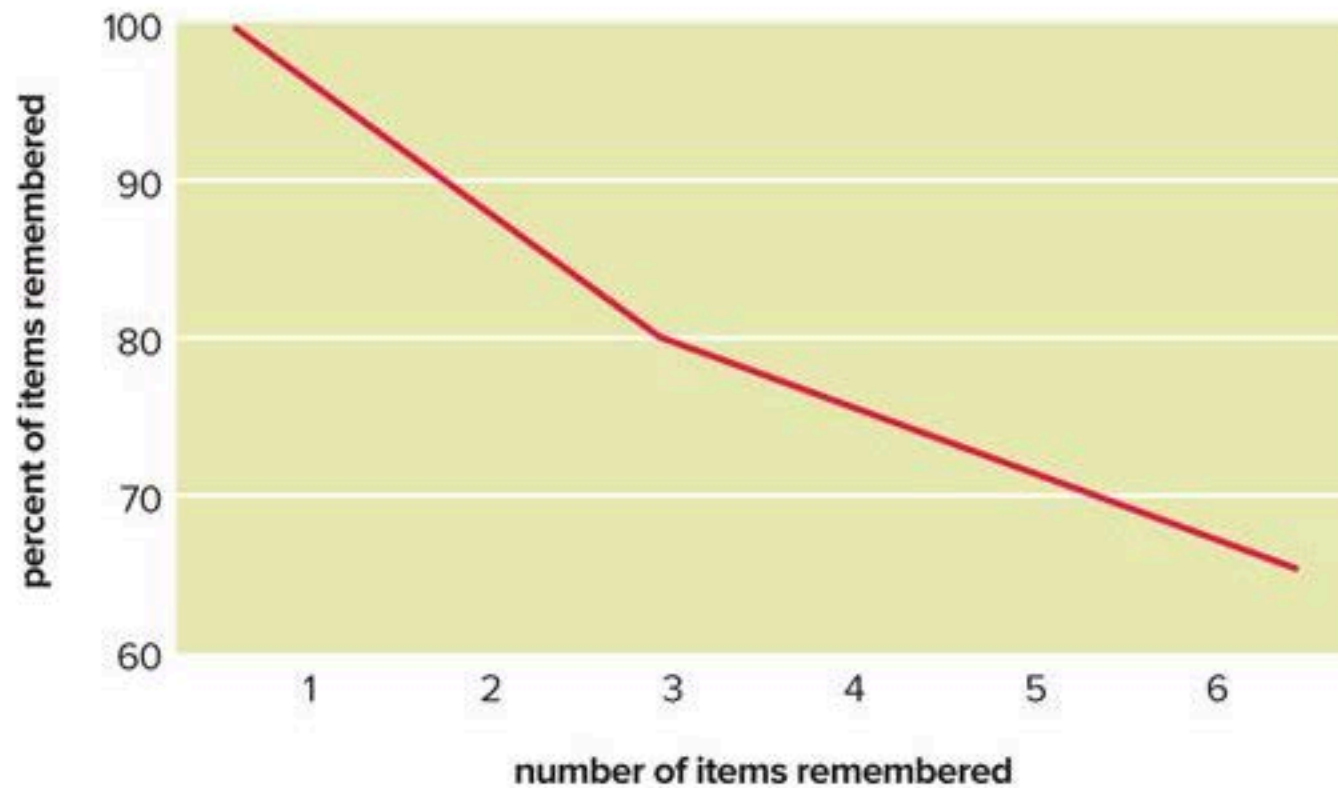
Instead of having to remember 10 separate numerals, a phone number has three chunks, with four or less items in each chunk. If you know the area code by heart (that is, it's stored in long-term memory), then you don't have to remember that part of the number, so you can ignore one whole chunk.

Years ago phone numbers were easier to remember because you mainly called people in your area code, so you didn't have to hold the area code in working memory. It was in long-term memory, which we will get to shortly. In the good old days you didn't even need to use the area code if the number you were calling from was in the same area code as you were dialing from (not true anymore in most places). And to make it even easier, everyone in town had the same exchange (the 569 part of the previous phone number). If you were dialing someone in your town with the same exchange, all you had to remember was the last four numbers. No problem! (I know I'm dating myself here by telling you how it used to be back in the old days. I live now in a small town in Wisconsin, and people here still give their number to others as the last four digits only, even though just four numbers won't work anymore).

The Four-Item Rule Applies to Memory Retrieval, Too

The four-item rule applies not only to working memory, but also to long-term memory. George Mandler (1969) showed that people could memorize information in categories and then retrieve it from memory perfectly if there were one to three items in a category. The number of items recalled dropped steadily when each category contained more than three items. If there were four to six items in a category, then people could remember 80 percent of the items. It went down from there, falling to 20 percent if there were 80 items in the category (**Figure 20.1**).

Figure 20.1. The more people are asked to recall, the less accurate their recollection is



Donald Broadbent (1975) asked people to recall items in different categories, for example, the Seven Dwarfs, the seven colors of the rainbow, the countries of Europe, or the names of current shows on TV. People remembered two, three, or four items clustered together.



Even chimps can do it

Nobuyuki Kawai and Tetsuro Matsuzawa (2000) trained a chimpanzee to take memory tests similar to the ones that are given to humans. The chimpanzee (named Ai) could correctly complete the memory tasks with 95 percent accuracy when she had to memorize four numbers. She was only 65 percent correct when there were five numbers.

Takeaways