The magic numbers 4 and 7. Modeling chunking in immediate memory.

Talk by Lucas Lörch at the TeaP 2019, London Metropolitan University

The main assumption of chunking theory is that knowledge about semantic units in a certain task domain can be used to compress incoming information. Although the maximal capacity of immediate memory is 4±1 information units, this information compression allows to enlarge the memory capacity by increasing the size of information units. As even random information can be compressed to a certain extent, a capacity limit of 7 single bits of information is typically found with random material. These assumptions were tested with a complex span task. Expert musicians (n=75) memorized the pitch of a single note and then played a simple melody on a piano at first sight. This procedure was repeated twelve times and then a memory test followed in which all memorized notes had to be recalled in correct order. The presence of semantic units was varied within-participants: in experimental trials, consecutive notes formed major chords, while in control trials they did not. As expected, mixed model analyses revealed that memory capacity was larger when the material contained semantic units. In experimental trials, the capacity limit was 3.18 chords while in control trials it was 7.32 single notes. The TBRS*C computational model integrates time-based decay, refreshing mechanisms and chunking. It is explicitly suited to model recall performance in complex span tasks. This model will be used to analyze the data in order to confirm its validity.