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The direct definition of the product of two $n \times n$ matrices involves n^3 multiplications. In the late 1960s, Strassen showed that fewer multiplications actually suffice. Let ω be the minimal exponent such that $n^{\omega+o(1)}$ multiplications are needed for large n . Then $2 \leq \omega < 3$, and Strassen's algorithm shows that $\omega \leq \log_{2^3}(7^3) < 2.81$.

The purpose of this talk is to give a brief, simplified survey of some ideas, due most notably to Cohn and Umans, that aim to use association scheme and coherent configuration constructions in order to decrease the known upper bounds on ω , and tackle the conjecture stating that $\omega = 2$. (Received March 02, 2013)