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Latin squares within latin squares

A latin square is an n by n array with each of n symbols occurring exactly once in each row and column, and a subsquare is a smaller latin square within a latin square. Given a partition $n = n_1 + n_2 + \cdots + n_k$, a realization is a latin square with disjoint subsquares of orders $n_1, n_2, \ldots, n_k$.

When there are at most four subsquares, the problem of existence of a realization has long been solved. This result has more recently been extended to five subsquares, and although it is tempting to consider six subsquares, at some point it is necessary to be bold and consider an arbitrary number of subsquares. As the first step into boldness, we prove a conjecture to be true: that if the largest three subsquares are exactly the same size, then such a realization always exists. Given that these realizations have an arbitrary number of subsquares, almost all of which could be of different sizes, the required constructions need to incorporate a large amount of flexibility. In this talk, we discuss some interesting parts of this construction, such as how to grow a subsquare.