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A geometric Classification of Trapezoid orders

We say that an order P on a set V is a *trapezoid order* if there are 2 lines (called baselines) parallel to the x-axis in the plane so that to each element v in V we may assign a trapezoid T_v whose bases are on the baselines with $u \prec v$ if and only if their trapezoids do not intersect and every point in T_u, has a smaller x-coordinate than some point in T_v. Bases may have equal or zero length so that parallelograms and triangles are special cases of trapezoids. The assignment of trapezoids (parallelograms, triangles) to elements of V is called a *trapezoid (parallelogram, triangle) representation* of (V, P). An ordered set is called a *proper* or *unit* trapezoid (parallelogram, triangle) order if it has a representation in which no trapezoid (parallelogram, triangle) is a proper subset of any other trapezoid (parallelogram, triangle) or in which each trapezoid (parallelogram, triangle) has unit area. It turns out these properties yield 20 distinct classes of trapezoid orders. In particular the classes of proper trapezoid orders and unit trapezoid orders are distinct, which is the answer to the question that motivated this research. This talk will be a survey of why there are 20 classes and why they are distinct.