Bruhat graphs and pattern avoidance

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Associated to each permutation (or, more generally, any element in a Coxeter group) is a graph called the Bruhat graph. We show that the permutations whose Bruhat graphs can be drawn on the plane or on the torus can be characterized by avoiding specific long lists of patterns. My motivation for this question comes from the observation that some properties of Schubert varieties are characterized by avoiding a long list of patterns but none are known so far to require an infinite list of ordinary patterns. Since these properties depend only on the Bruhat graph, the question arises as to whether there is a purely combinatorial explanation for finiteness.

This is joint work with Christopher Conklin with some further contributions from Michael Eldredge.