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DISTRIBUTIVE SUBLATTICES OF BRUHAT ORDERS:
THE HARRIS-KLEITMAN INEQUALITY FOR FINITE
COXETER GROUPS

Let W be a finite Coxeter group. The sorting orders introduced by Armstrong coarse the Bruhat order on W and turn W into a lattice. We classify those sorting orders that turn W into a distributive lattice and deduce that there is at least one such sorting order for every irreducible W with the sole exception given by $W = E_8$. As an application, we prove an analogue of the Harris–Kleitman inequality for finite Coxeter groups, which asserts that any two upward-closed subsets of W in the Bruhat order are positively correlated. This generalises both the original Harris–Kleitman inequality for hypercubes as well as the more recent analogue for symmetric groups proved by Johnson, Leader and Long.

This is joint work with Pavel Turek.