Paul Erdős Memorial Lecture
Fractional Helly theorem, weak epsilon nets and geometric piercing

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Helly's famous theorem asserts that for a family of n convex sets in R^d if every $d+1$ members of the family have a point in common then there is a point in common for all sets in the family. Alon and Kleitman, solved an old standing conjecture of Hadwiger and Debrunner and showed that if we relaxed the conditions in Helly's theorem and demand that from each q of the sets $d+1$ has a point in common then the family can be "pierced" by $F(d,q)$ points. $F(d,k)$ does not depend on n.

We will describe subsequent works and report on some work in progress by various researchers including Alon, Barany, Furedi, Kleitman, Matousek, Meshulam, Vu, and the speaker concerning various extensions of the Alon-Kleitman theorem and aimed at better understanding of the underlined combinatorics.