Choosability of graph powers

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The Total List Coloring Conjecture asserts that every total graph is chromatic-choosable, i.e. its choosability is equal to its chromatic number. The Square List Coloring Conjecture is stronger, asserting that every square of a graph is chromatic-choosable; however, Kim and Park disproved the Square List Coloring Conjecture. Zhu asked whether the analogous statement for kth powers holds for any k. We prove that this is not the case. Using affine planes, we construct infinitely many graphs whose choosability exceeds their chromatic number by a logarithmic factor. On the other hand, we prove a polynomial upper bound for the choosability of kth powers ($k > 1$) in terms of chromatic number. Joint work with N. Kosar, S. Petrickova, and E. Yeager.