1146-05-85 **Hemanshu Kaul*** (kaul@iit.edu), Deparment of Applied Mathematics, Illinois Institute of Technology, Chicago, IL 60616. *The gap between the list-chromatic and chromatic numbers.*

A classic result on the gap between the list chromatic number and the chromatic number tells us $\chi_\ell(K_{a,b}) = 1 + a$ if and only if $b \geq a^a$; the values of b for which $\chi_\ell(K_{a,b})$ is as large as possible and far from $\chi(K_{a,b}) = 2$. In this talk, we will describe when $\chi_\ell(G \Box K_{a,b})$ is far from $\chi(G \Box K_{a,b}) = \max\{\chi(G), 2\}$. Starting with any chromatic-choosable G, and taking its Cartesian product with a sequence of appropriate $K_{a,b}$, we can construct a sequence of graphs that at each step get one farther from being chromatic-choosable. It is easy to show $\chi_\ell(G \Box K_{a,b}) \leq \chi_\ell(G) + a$. In 2006, Borowiecki et al. showed that this bound is attainable if b is sufficiently large.

Given any graph G, we wish to determine the smallest b such that $\chi_\ell(G \Box K_{a,b}) = \chi_\ell(G) + a$. We show that the list color function, a list analogue of the chromatic polynomial, provides the right concept and tool for making progress on this problem. Using the list color function, we prove a sharp general improvement on the 2006 bound, and we compute the smallest such b exactly for families of critical chromatic-choosable graphs. This is joint work with Jeffrey Mudrock. (Received January 09, 2019)