

# On the 2<sup>nd</sup> Kahn-Kalai conjecture and Bayesian inference connections

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## **ABSTRACT**

For a given graph  $H$  we are interested in the critical threshold  $p$  so that a sample from the Erdos-Renyi random graph contains a copy of  $H$  with high probability. Kahn and Kalai in 2006 conjectured that it should be given (up to a logarithm) by the minimum  $p$  so that in expectation all subgraphs  $H'$  of  $H$  appear in the random graph. In this work, we will present a proof of a modified version of this conjecture. Our proof is based on a powerful “spread lemma”, which played a key role in recent breakthroughs (a) on the Erdos-Rado sunflower conjecture (which enjoys many TCS applications) and (b) the fractional Kahn-Kalai conjecture. Time permitting, we will also discuss a new proof of the spread lemma using Bayesian inference tools.

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