

Taking many steps but not getting very far

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Abstract. My goal in this talk is to present three seemingly disparate topics in mathematics: The Caccetta Haggkvist conjecture (graph theory), growth rates of infinite groups, and bounds in computational complexity, in a common framework. After establishing this context, I will discuss a handful of theorems. Finally, I will conjecture an approximate structure theorem where the key structure is a (d-dimensional) grid. If true, this conjecture would imply two celebrated results from the last 1/2-century: Freiman's theorem on sumsets in \mathbb{Z} , and Gromov's theorem on groups of polynomial growth.