Expected Runtime of Evolutionary Algorithms on Plateaus

One approach to solving optimization problems is to use an evolutionary algorithm. Such algorithms can successfully solve certain optimization problems, but there are certain properties of real valued functions that can make them difficult to optimize. In particular, when a fitness function has plateaus of constant fitness, selection cannot help in climbing to a more optimal point. This talk will describe evolutionary algorithms, assuming the audience has no background on them. Then, focusing on a certain simple evolutionary algorithm, exact results will be given that specify how long this algorithm takes (in expectation) to optimize certain plateaus. The main ideas in how to prove these results will also be given, but tedious technical details necessary for the proofs will be left out. One key idea is to view the process as a random walk on a group. Although some knowledge of group theory is needed to follow part of this talk, most of the talk will not use any abstract algebra and so will be understandable to a general audience.