In this paper, we have shown that stochastic subgradient and mirror descent approaches extend in an elegant way to situations in which we have no access to i.i.d. samples from the desired distribution. In spite of this difficulty, we are able to achieve reasonably fast rates of convergence for the ergodic mirror descent algorithm—the natural extension of stochastic mirror descent—under reasonable assumptions on the ergodicity of the stochastic process ξ1,ξ2,... that generates the samples. We gave several examples showing the strengths and uses of our new analysis, and believe that there are many more. In addition, our results give a relatively clean and simple way to derive finite sample rates of convergence for statistical estimators with dependent data without requiring the full machinery of empirical process theory (e.g. [Yu94]). A natural extension of this work, which we hope to be able to accomplish, is to relax the assumptions on the uniformity of the mixing times in Assumption B, which would allow a wider range of applications of our results.