Using independent open-to-closed transitions to simplify aggregated Markov models of ion channel gating kinetics

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Short Abstract — **A large and growing experimental effort is devoted to ascertaining reaction kinetics for biologically important molecules and those that produce binary (on/off) output are among the most important. Simple Markov models consistent with the given data give insight into mechanism and can also suggest new mechanisms for drug targeting. Still there are fundamental difficulties with the identification of binary Markov chains from time series data. The fundamental difficulty is the lack of identifiability of very simple binary Markov chains if there are more than two distinct states that are both "off". For example COC ("C" for "closed" or "off", and "O" for "open" or "on") is indistinguishable from CCO on the basis of steady state data taken at a single value of the external control parameters. We show how to side-step these difficulties.**

Keywords — **channels, Markov kinetics**

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