

Randomized group up and down experiments

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Abstract An up and down (U&D) procedure is a sequential experiment used in binary response trials for identifying the treatment corresponding to a pre-specified probability of positive response. Recently, a group version of U&D procedures has been proposed whereby at each stage a group of units is treated at the same level and the number of observed positive responses determines the treatment assigned to the next group. The deterministic nature of this algorithm leads to some limitations that in this paper we propose to overcome by introducing a randomization mechanism. A broad class of randomized group U&D's is presented, giving the conditions for targeting the treatment level of interest. In addition, we study how the properties of the design change as we vary the method of randomization within this general class and find randomization schemes which guarantee desirable results in terms of the asymptotic behavior of the experiment.

Keywords Dose-response problems · Phase I clinical trials · Markov chain · Random walk · Sequential experiments · Stochastic ordering · Stationary distribution