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 algo-
rithm 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 random-
ization schemes which guarantee desirable results in terms of the asymptotic
behavior of the experiment.