

# Sequential testing revisited: linking statistics and ruin theory

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## Abstract

Abraham Wald's classical sequential probability ratio test for one simple hypothesis against an alternative is based on the boundary crossing of an associated random walk. Using techniques from ruin theory, we derive explicit expressions for the decision boundaries of such a sequential testing procedure for a distribution parameter from i.i.d. observations of certain classes of random variables, including Erlangs. Information on the mean sample size of the test can be retrieved as well. The approach relies on the use of scale matrices associated to corresponding Markov additive processes. This simplifies and extends earlier results of Teugels & Van Assche.

**Keywords:** hypothesis testing, ruin theory, random walk, Markov additive processes