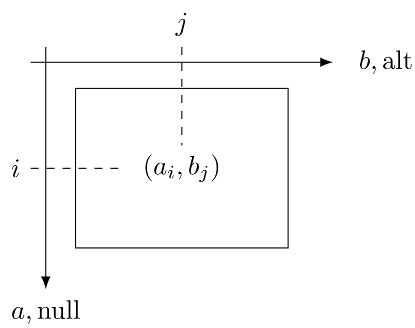
aftermath::sequential

parallel_stopping_time motivation. Consider a rule (τ, d) that decides between two hypotheses $\mathcal{H}_0$ and $\mathcal{H}_1$, where $\tau = \min\{t_0, t_1\}$,

$$t_0 = \inf\{n \geqslant 1 \,:\, R_n \geqslant a\}, \qquad t_1 = \inf\{n \geqslant 1 \,:\, S_n \geqslant b\},$$

and $d = j$ if $\tau = t_j$, $j = 0, 1$. When both thresholds are crossed at once, i.e., $\tau = t_0 = t_1$, we consider the decision erroneous.

For efficiency reasons, rather than perform simulations for a given pair of thresholds (a, b), we construct a grid of thresholds (a_i, b_j) with $a_1 < a_2 < \cdots < a_m$ and $b_1 < b_2 < \cdots < b_n$. We will call the thresholds a, b, null and alternative, respectively.



The stopping time τ will run as long as at least one of the threshold pairs in the matrix has not been crossed, or equivalently as long as (a_m, b_n) has not been crossed. For each pair of thresholds, we record the observed value of τ, and the decision made (1 if $d = 0$; 2 if $d = 1$; 3 if $\tau = t_0 = t_1$).

When the first observation is collected, the Γ-shaped region (dotted on the figure below) in the corresponding matrices will be filled. With each next step the decision will have been made in a Γ-shaped region. Let i_k and i_{k+1} denote the indices of the first uncrossed null threshold at steps k and $k+1$, respectively. Let j_k and j_{k+1} denote the corresponding indices of the first uncrossed alternative thresholds. Then the decisions associated with $\tau = k + 1$ will have the following form.