Acceptance-rejection method

Use an **instrumental distribution** g (which we know how to sample from)
$\Rightarrow$ to sample from the target distribution f

The general principle is to **choose** g **close to** f and to propose samples from g, to accept some and reject others to get a sample following f.

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Let f be the targeted density function

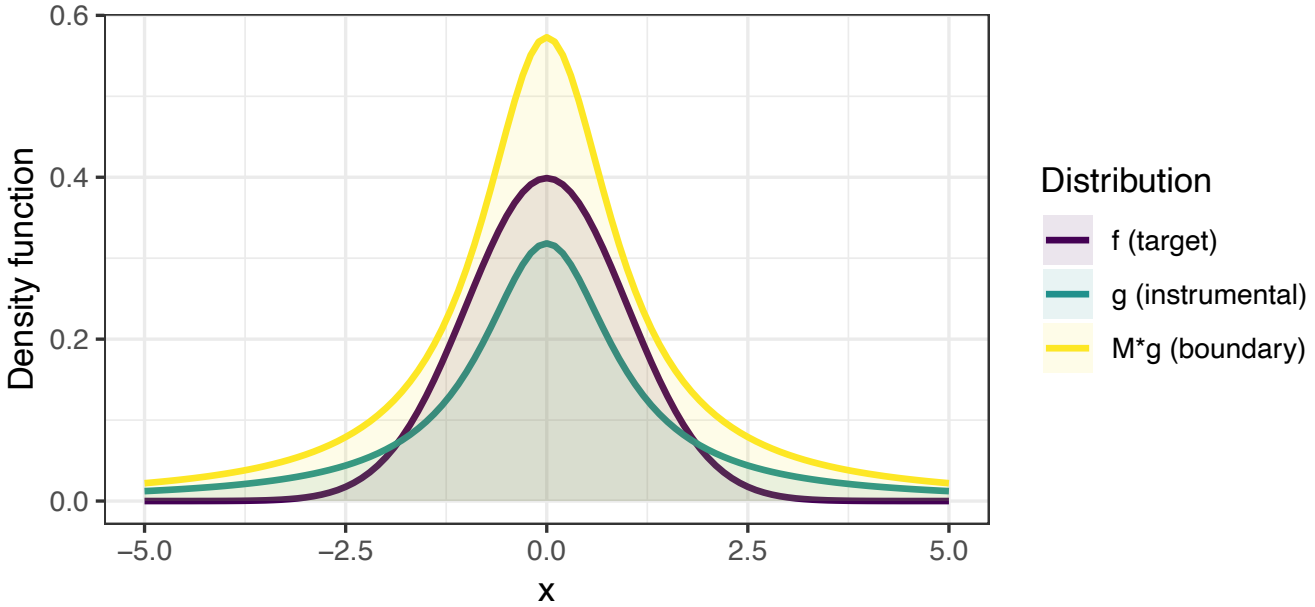
Let g be a proposal density function (from which one knows how to sample) such that, for all x: $f(x) \leq Mg(x)$

While $i \leq n$:

1. Sample $x_i \sim g$ and $u_i \sim \mathcal{U}_{[0,1]}$
2. If $u_i \leq \frac{f(x_i)}{Mg(x_i)}$, **accept** the draw:
   $y_i := x_i$
   else **reject** it and return to 1.

$\Rightarrow (y_1, \ldots, y_n) \overset{iid}{\sim} f$

Acceptance-rejection: importance of the proposal



Example of a proposal and a target ditribution for the accept–reject algorithm

Remarque : The smaller M, the greater acceptance rate

$\Rightarrow$ the more the algorithm is efficient at sampling from f (less iterations for a sample size n)

So one wishes g the as close as possible to f !

⚠ g will necessarily have heavier tail than the target
$\Rightarrow$ when the number of parameters increases, acceptance rate decrease svery rapidly (*curse of dimension*)