**Objective function values**

\[ f(x) \]

**Multiple (local) optima**

Failure: No useful gradient information

**Rugged**

Failure: Neutral area or area without much information

**Deceptive**

Failure: Region with misleading gradient information

**Neutral**

Failure: Neutral area

**Needle in a haystack**

Failure: Neutral area or area without much information

**Nightmare**

Failure: Neutral area or area without much information

**Best case**

Success: x

**Low variation**

Success: x

**Unimodal distribution**

Bimodal distribution

**Multimodal distribution**

Flat distribution

**Parameter values**

**Convergence process**

**Convergence criteria:**

Failure: maximum number of function evaluation has been reached.

Failure: population has converged to a pre-specified small geometric range.

Success: best point has improved in last loops by less than the threshold.