Branching ratio, sub- and super-critical regimes

- branching ratio *n* = average number of aftershocks per event :

$$n = \int_{m_0}^{\infty} dm\, P(m) \int_0^{\infty} dt\, \phi_{m'}(t) = \frac{K\, b\, c^{-\theta}}{(b-\alpha)\theta} \qquad \text{if } \alpha<b \text{ and } \theta>0$$

Different regimes depending on the values of n, θ and α :

- sub-critical regime for *n* <1
  - after a large mainshock, the seismicity rate decrease with time
  - the total number of aftershocks is finite
- super-critical regime for *n* >1 and $\theta>0$
  - after a large mainshock, the seismicity rate first decrease with time and then grows exponentially with time
  - the total number of aftershocks is infinite
- case $\theta<0$ (local exponent *p* <1) yields an infinite n-value
  - ~ same behavior as for the super-critical regime
- case $\alpha>b$ yields an infinite *n* value :
  - N(t) infinite at all times, integral of $\phi_m(t)$ over m unbounded