# Logistic

## Parametrisation

The logistic distribution is

$$f(y) = \frac{\kappa \exp(-\kappa(y-\mu))}{(1+\exp(-\kappa(y-\mu)))^2}$$

for continuously responses $y$ where

**$\mu$:** is the the mean

**$\kappa = \tau s \pi / \sqrt{3}$:** where $\tau$ is the precision

**$s$:** is a fixed scaling, $s > 0$.

## Link-function

The mean and variance of $y$ are given as

$$\mu \quad \text{and} \qquad \sigma^2 = \frac{1}{s\tau}$$

and the mean is linked to the linear predictor by

$$\mu = \eta$$

## Hyperparameters

The precision is represented as

$$\theta = \log \tau$$

and the prior is defined on $\theta$.

## Specification

- family = `logistic`
- Required arguments: $y$ and $s$ (keyword `scale`)

The scalings have default value 1.

### Hyperparameter spesification and default values

**hyper**

**theta**

**name** log precision
**short.name** prec
**initial** 1
**fixed** FALSE
**prior** loggamma
**param** 1 5e-05
**to.theta** `function(x) log(x)`
**from.theta** `function(x) exp(x)`

**survival** FALSE

**discrete** FALSE

**link** default identity

**pdf** logistic

## Example

```
rlogistic = function(n, mean = 0, sd = 1)
{
    p = runif(n)
    A = pi/sqrt(3)
    tauA = A/sd^2
    return ((tauA * mean - log((1-p)/p))/tauA)
}

n = 1000
z = rnorm(n, sd=0.1)
eta = 1 + z
y = rlogistic(n, mean = eta,  sd = 1)

r = inla(y ~ 1 + z,  data = data.frame(y, z), family = "logistic",
        control.compute = list(cpo=TRUE))
```

## Notes

None.