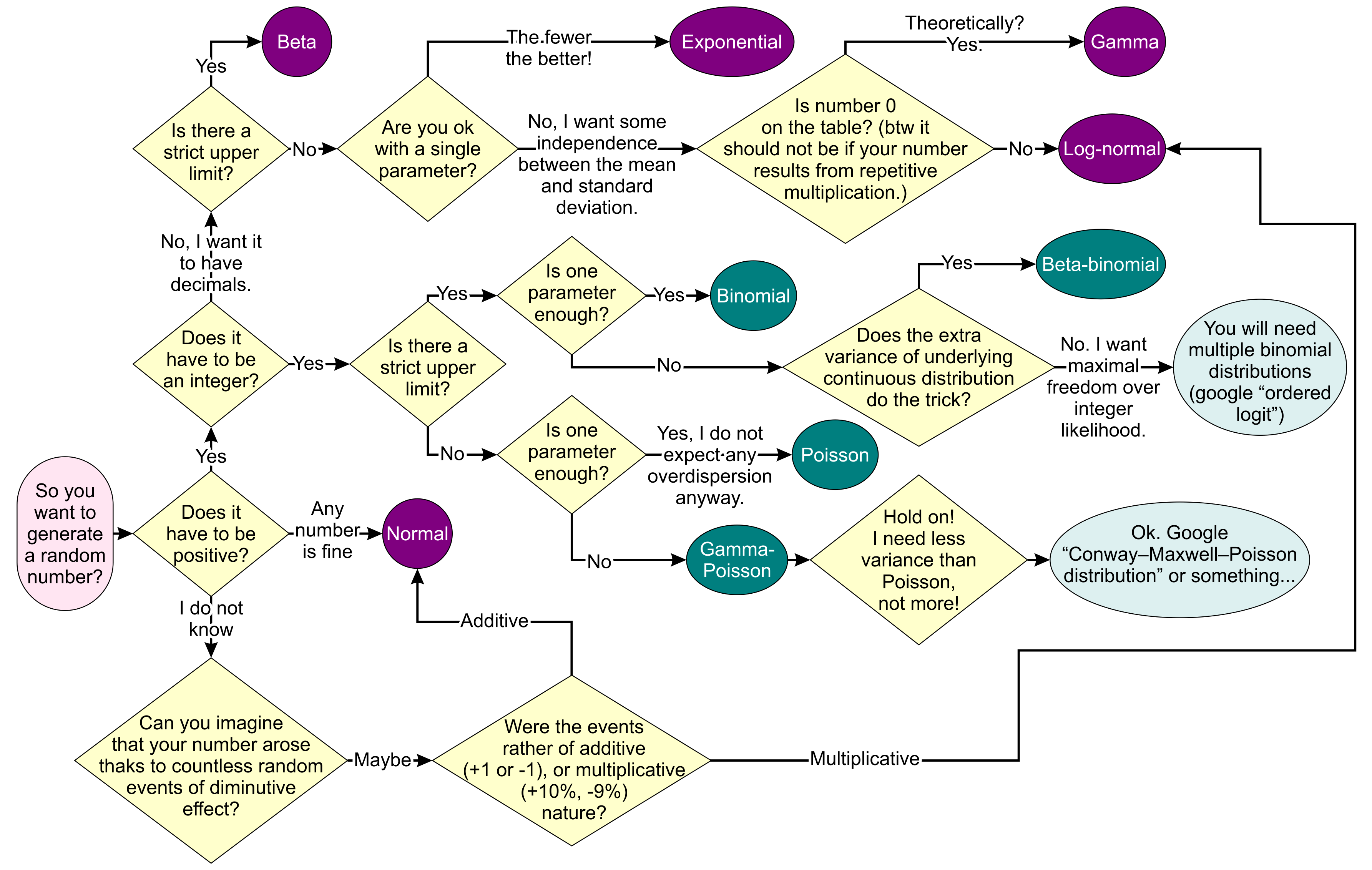
|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **distribution** | **example** | **parameters** | | | **probability density|mass function for** | **mean** | **standard deviation** | **supported** | **generate 10 numbers in R estimate the likelihood of in R** |
| **normal** | SAT score |  | | |  |  |  | continuum | rnorm(n=10,mean=,sd=) |
|  | | | dnorm(,mean=,sd=) |
| **log-normal** | species area |  | | |  |  |  | continuum | rlnorm(n=10,meanlog=,sdlog=) |
|  | | | dlnorm(,meanlog=,sdlog=) |
| **exponential** | time between two earthquakes |  | | |  |  |  | continuum | rexp(n=10,rate=) |
| dexp(,rate=) |
| **gamma** | time it takes to finish PhD |  | | |  |  |  | continuum | rgamma(n=10,shape=,rate=) |
| or | | | dgamma(,shape=,rate=) |
| **beta** | proportion of skin covered by clothing |  | or |  |  | or | or | continuum | rbeta(n=10,shape1=\*,  shape2=(1-)\*) |
|  |  | dbeta(,shape1=\*,shape2=(1-)\*) |
| **Poisson** | customers per day (same shop) |  | | |  |  |  | counts | rpois(n=10,lambda=) |
| dpois(,lambda=) |
| **gamma-Poisson** | customers per day (different shops) |  | | |  |  |  | counts | rpois(n=10,lambda=  rgamma(n=10,shape=,rate=/)) |
|  | | | dnbinom(,size=,prob=/(+)) |
| **binomial** | number of dates out of invitations for coffee |  | | |  |  |  | counts | rbinom(n=10,size=,prob=) |
|  | | | dbinom(,size=,prob=) |
| **beta-binomial** | number of dates out of invitations for coffee (different people) |  | or |  |  | or | or | counts | rbinom(n=10,size=,prob=rbeta(n=10,  shape1=\*,shape2=(1-)\*)) |
|  |  | dbetabinom<-function(x,mup,shape,size){  a<-mup\*shape; b<-(1-mup)\*shape  choose(size,x)\*  (gamma(x+a)\*gamma(size-x+b)\*gamma(a+b))/  (gamma(size+a+b)\*gamma(a)\*gamma(b))}  dbetabinom(,mup=,shape=,size=) |
|  | | |

\*parameters with asterisk can assume both positive and negative values, other parameters are always positive, for the explanation of the gamma function and intuition about , parameters of beta, flip the paper

Obsah obrázku text, diagram, Vykreslený graf, řada/pruh

Popis byl vytvořen automaticky

**Petr Tureček**

**ISHE 2023**

logistic function generalizes

to

which is used in

regressions

with categorical

( possible

outcomes)

dependent

variables

**Mapping between real number and probability domain with logit and logistic functions**

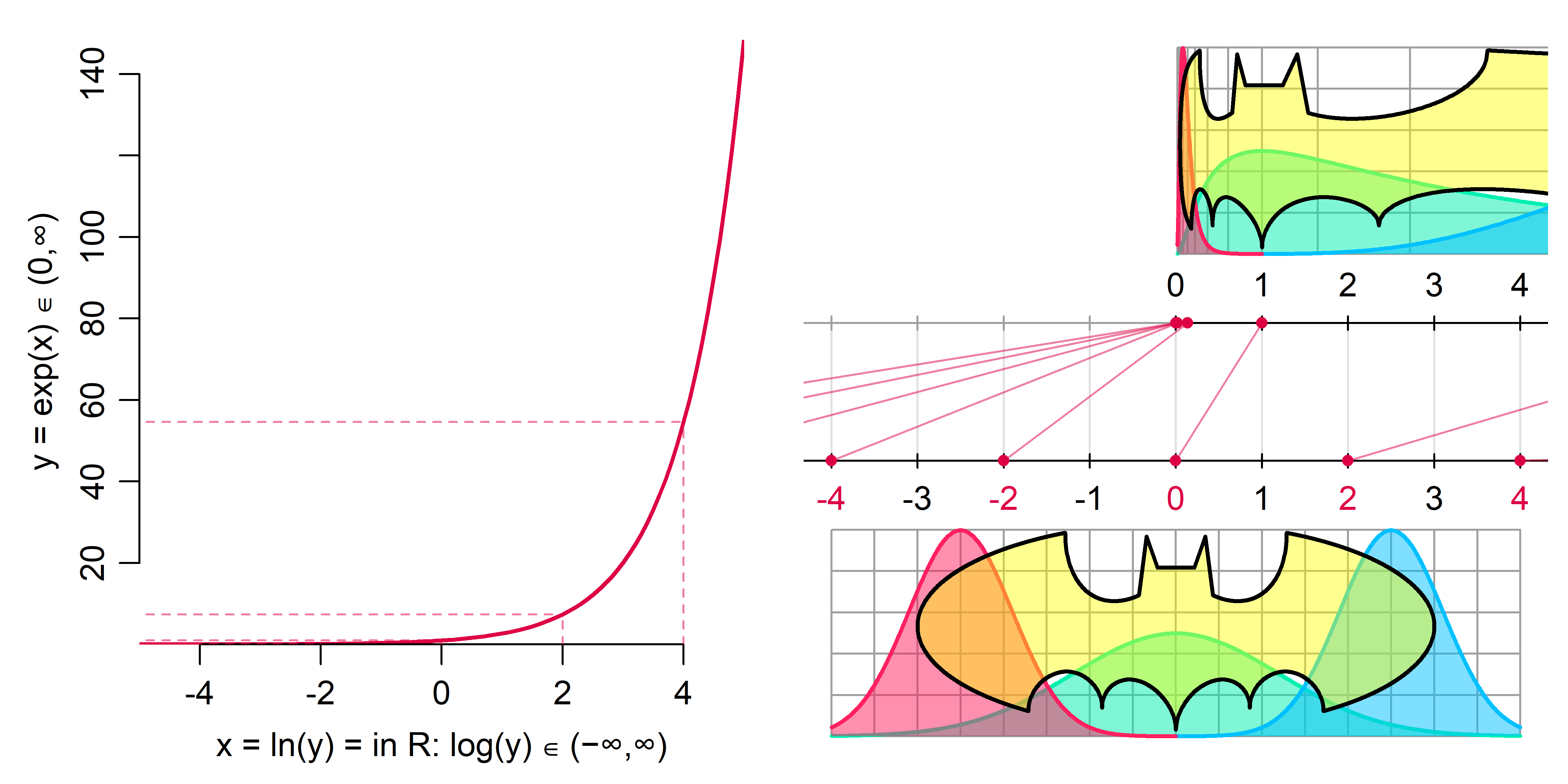
**logit**

**log-odds**

**logistic**

**inv\_logit**

**Maximum entropy inspired flowchart of distribution selection**



**realm of additive processes**

**Mapping between real and positive domain with logarithm and exponential f.**

**realm of multiplicative processes**

logarithm was **designed** to translate between additive and multiplicative processes:

**exponential**

**exp**

Categorical variable enters a model as:

**index**:

**indicator:**

**contrast:**

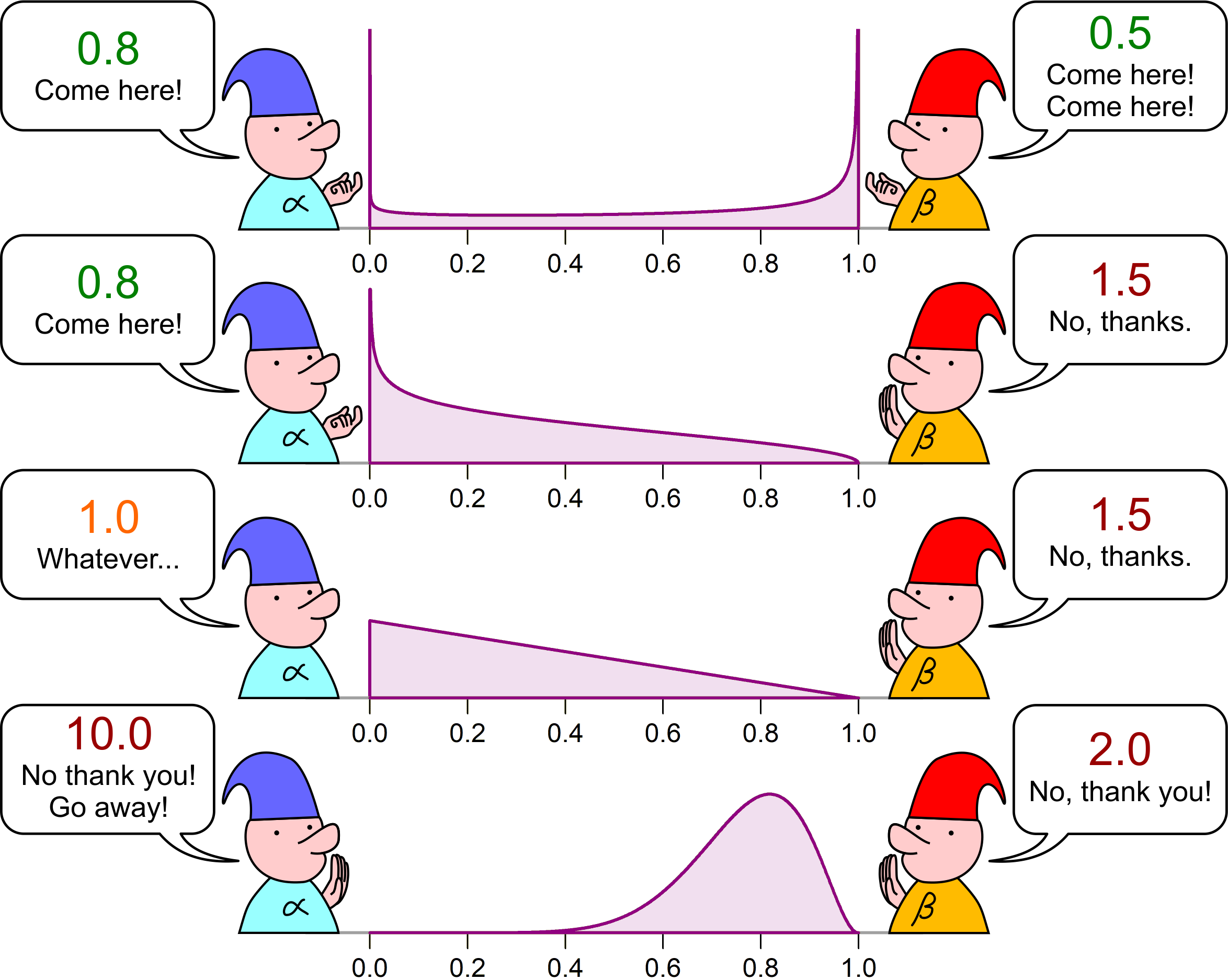
**logarithm**

**log**

**and parameters**

**of beta distribution**

**as dwarfs**



**Statistical model is just a set of equations** such as

**Bayes theorem (assessing hypothesis probability) can be viewed as two consecutive lotteries:**

First lottery (prior) works with probabilities that random hypotheses, sets of parameter values , are even considered for participation in the second lottery.

Second lottery draws each hypothesis from the first drawth with probability proportional to likelihood that data occur under .

Obsah obrázku text, snímek obrazovky, Písmo, řada/pruh

Popis byl vytvořen automaticky

**Data distributions illustrated with fish**

**gamma function**

is a generalization of factorial () to all complex numbers except non-positive integers. Because it generalizes to all positive real numbers, it extends many distribution functions beyond integer parameter values ( is an example of parameter worthy of extension).

**Some clever(er) log-transformations**

lx<-log(x,1.1)-log(median(x),1.1) #each +1 represents 10% increase, 0 is median

lx<-log(x,2)-log(median(x),2) #each +1 represents doubling, 0 is median

#Back to the original scale (works with any base, just replace 1.1)

1.1^(lx+log(median(x),1.1))