# Results

## Analysis 1: Gamma Functions

Although there is an intuitive expectation that models with small effect sizes being more common than large ones (eg exponential and gaussian centred at 0), this needs to be checked. The family of gamma distributions encompasses a wide range of possible shapes, see Figure 1. With the shape parameter, , the function is identical to an exponential.

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Figure

The procedure was to find the ML estimates for  and  at each of a series of values for shape, . The result is shown in the next figure. For a range of different shape parameters, the maximum likelihood is found for . It is interesting to note that when  is greater than 1, the estimate for  has a much higher value. This is evidence that the distribution of population effect sizes is heavily weighted towards zero.

## Analysis 2: Gaussian vs Exponential

In this analysis, two different one-parameter distributions are compared. The procedure was as before, to find the ML estimates for  and  in each case. This time, the figure shows how likelihood varies with  and  for: exponential model (red) and gaussian model (yellow).

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Figure

The MLE fit for the better of the two (exponential) is this:

## Analysis 3: Generalized Exponential (I have a feeling this becomes more complex than we want)

There is a useful extension to the exponential distribution, a slightly modified version of the generalised exponential distribution: [see here](https://www.sciencedirect.com/science/article/abs/pii/S0378375807001152#:~:text=Generalized%20exponential%20distribution%20has%20a,the%20gamma%20and%20Weibull%20distributions.). It has the general form of:

where is a shape parameter.

Example distributions for values of  ranging between 1 and 16 are shown in Figure 3.

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Figure

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Here is the same result but for a simulated set of effect sizes, that are drawn from an exponential model:

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This lends credence to the observation that the previous result is true.