

The beginners explanation
of **Gamma Correction**
and Linear Workflow



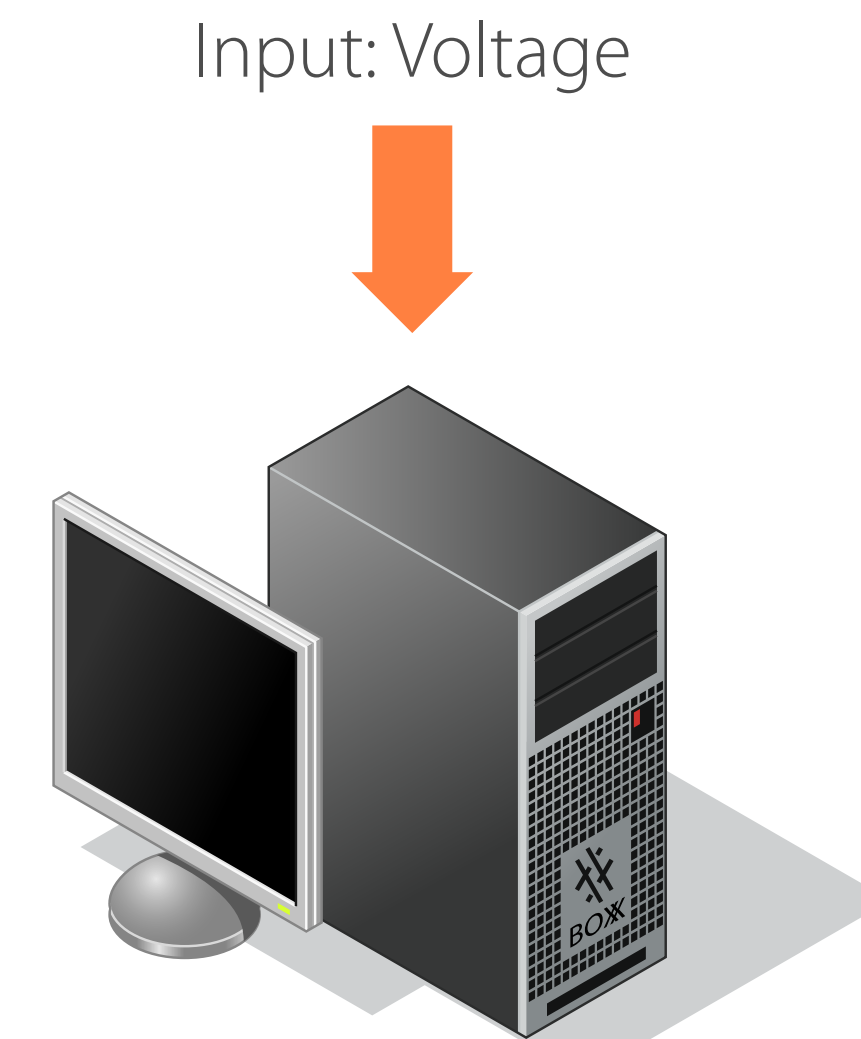
What is Gamma?

It's all to do with how devices display images



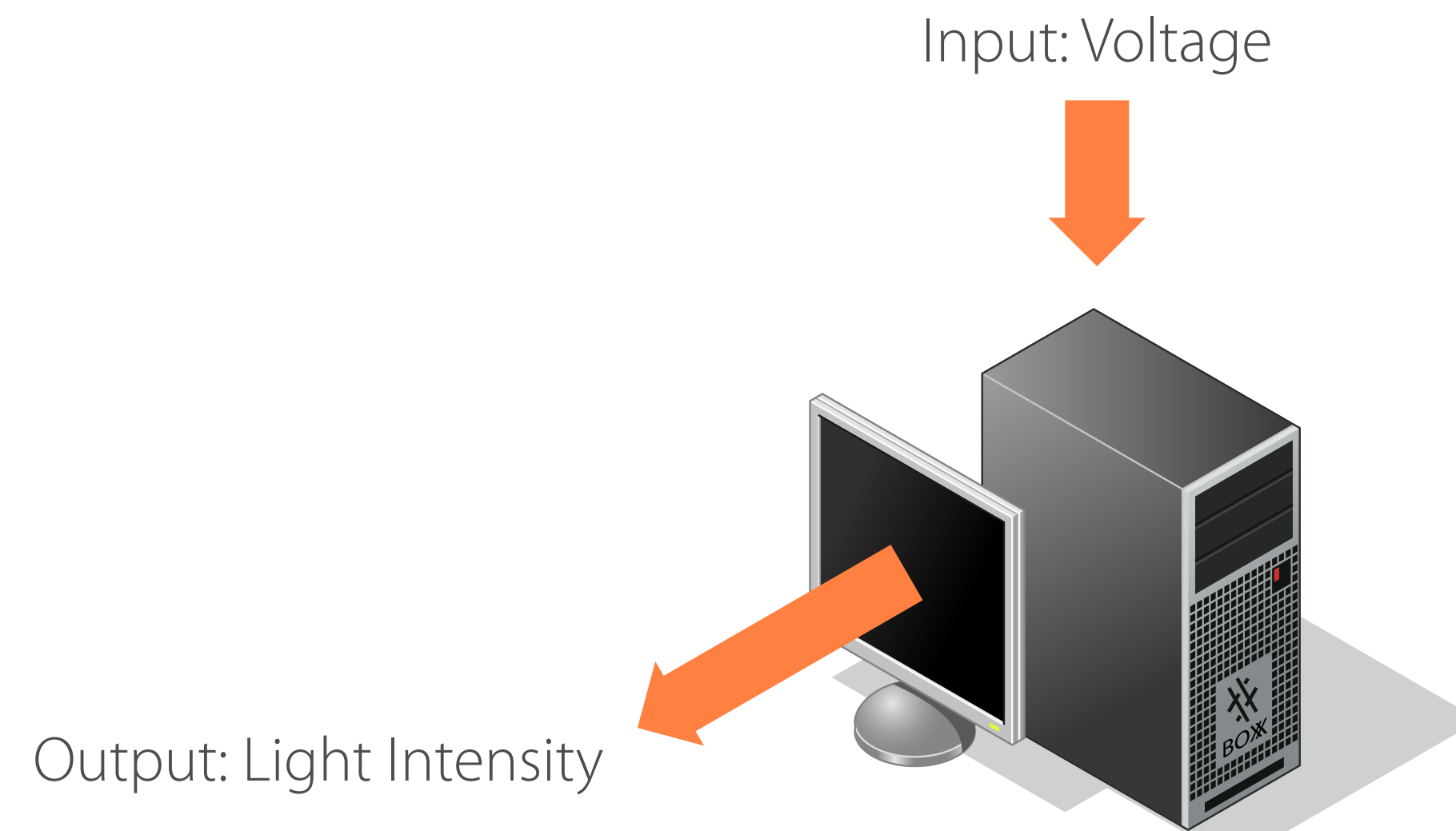
What is Gamma?

To display images on screen an input voltage is applied



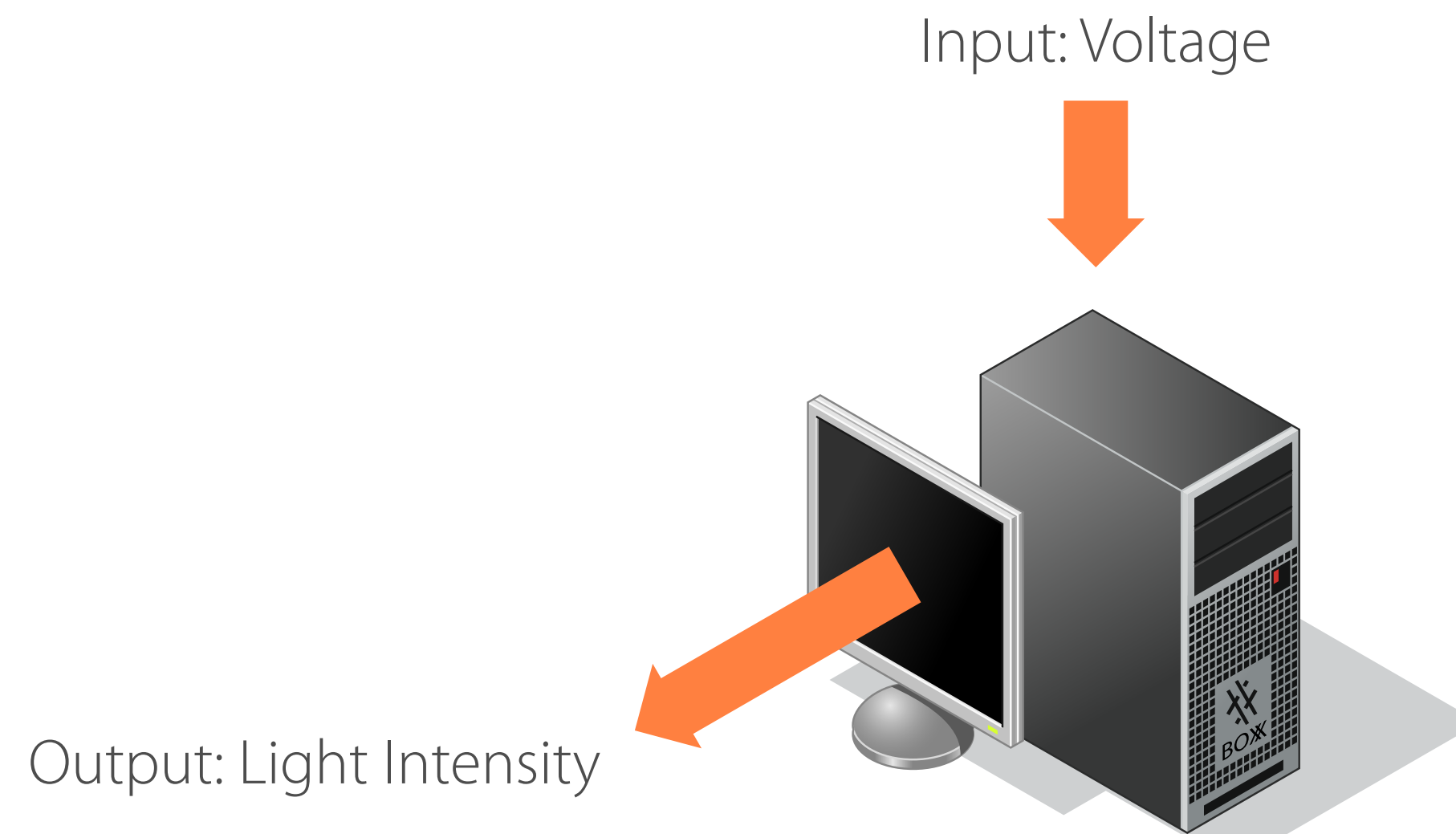
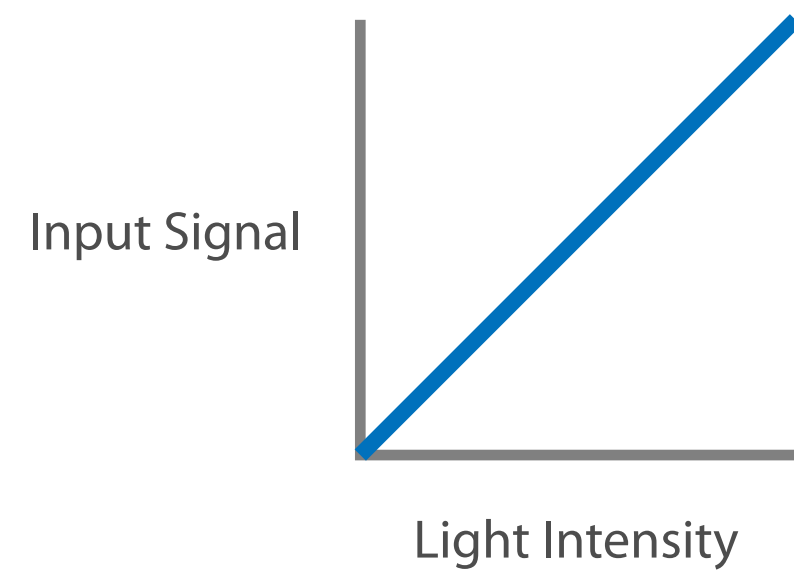
What is Gamma?

Which outputs as light intensity on the screen



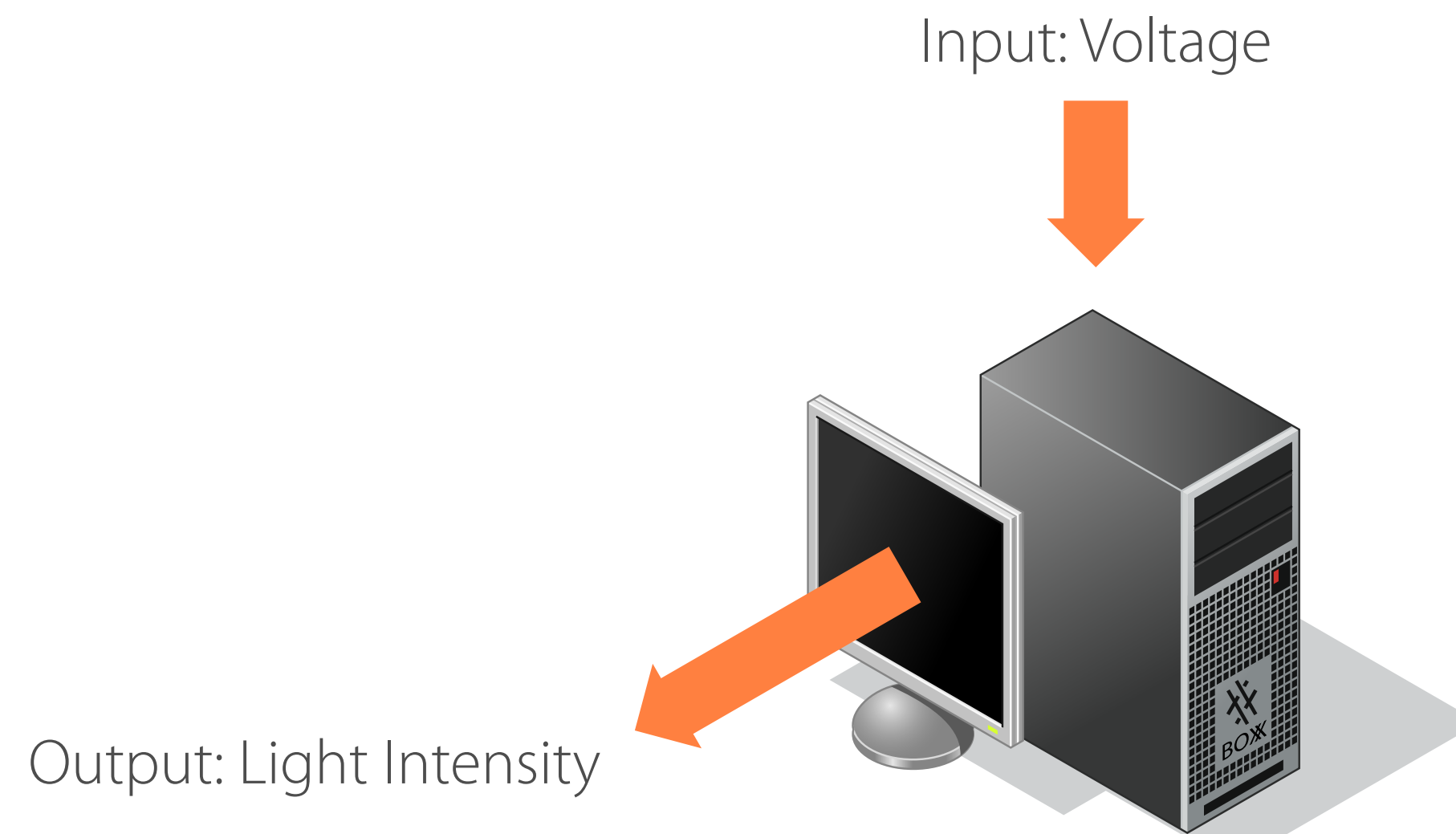
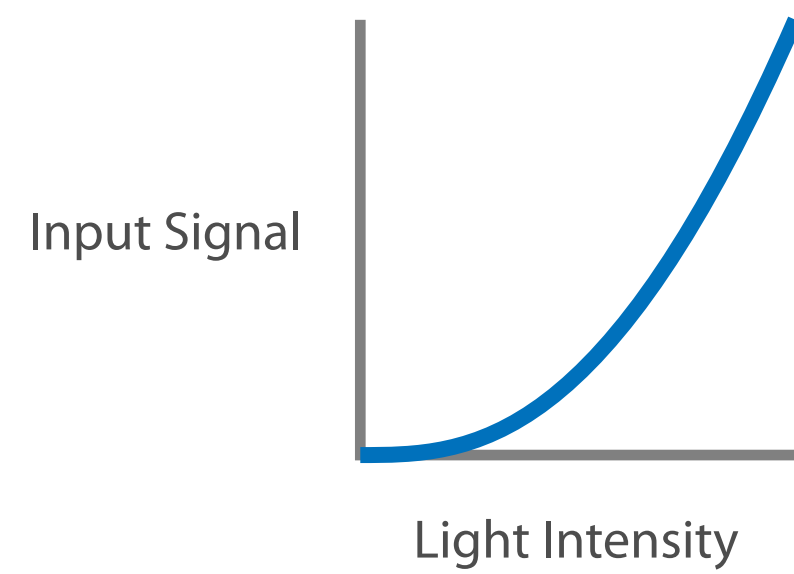
What is Gamma?

In a perfect world, the input would equal the output linearly



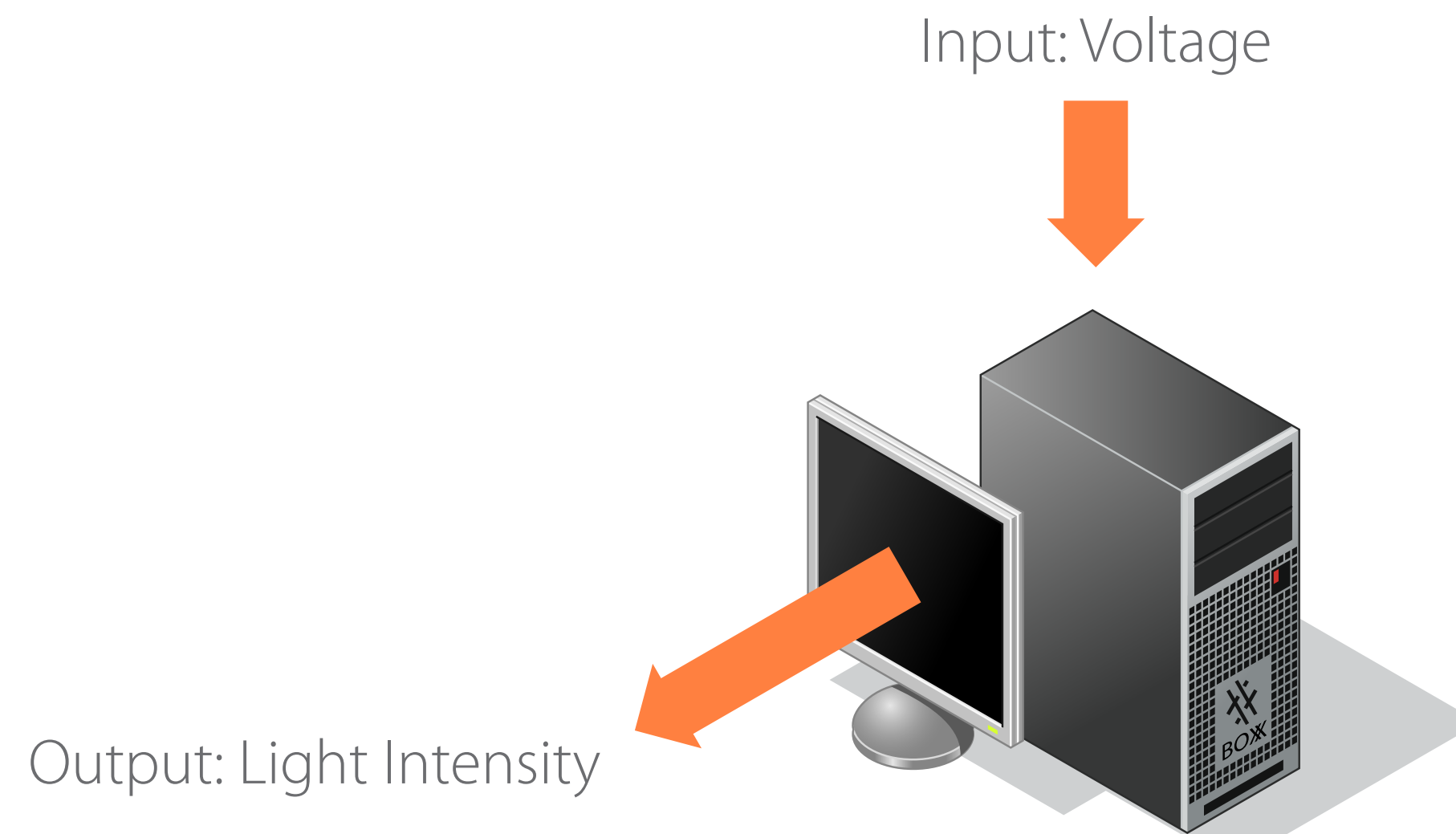
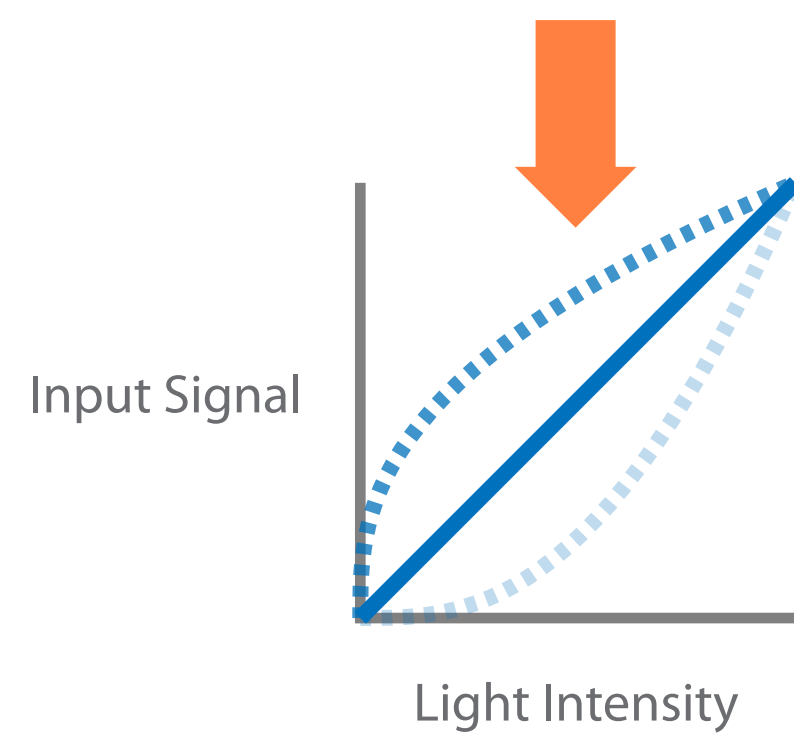
What is Gamma?

But it actually looks something like this (a 'powerlaw' function)



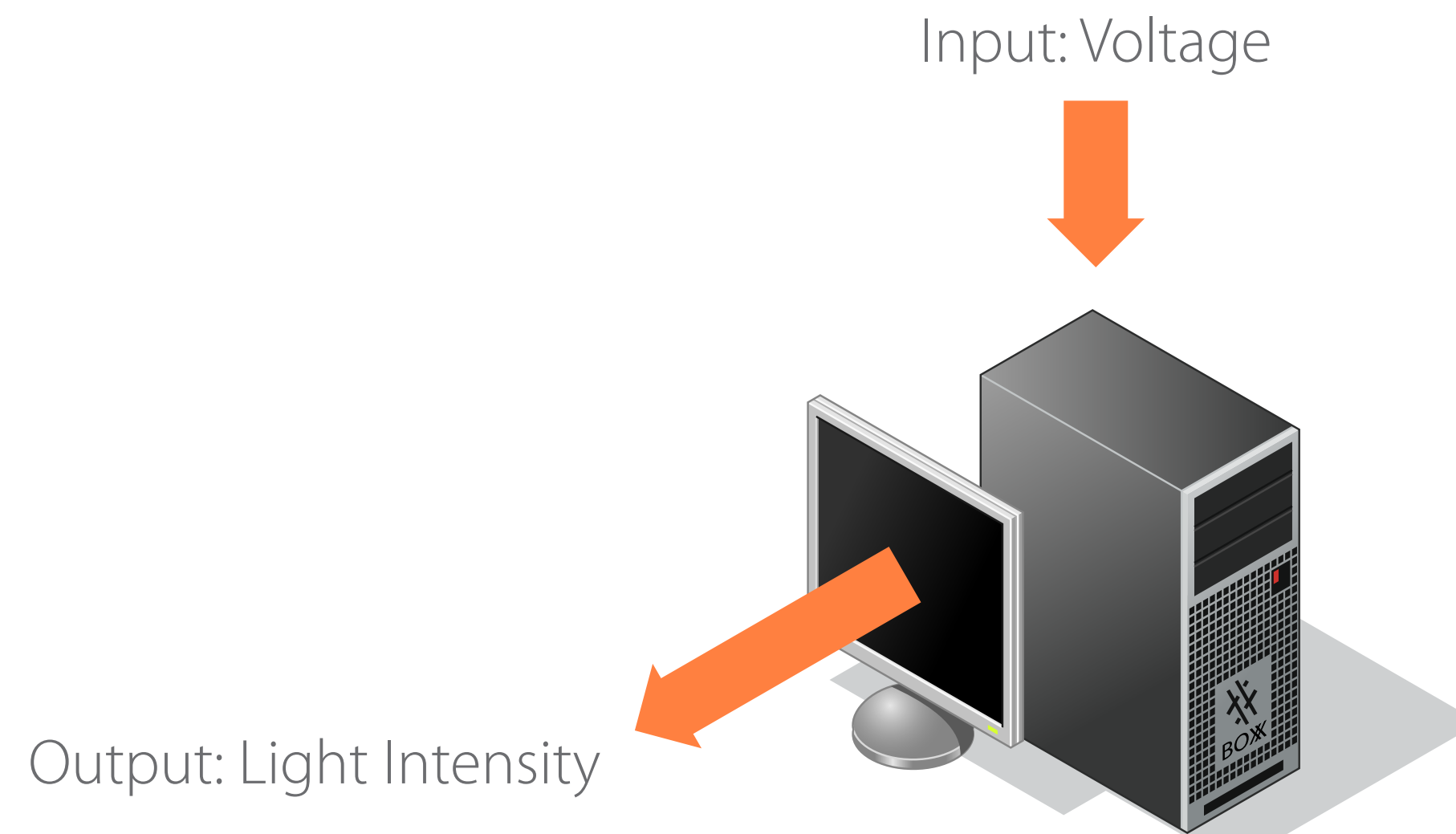
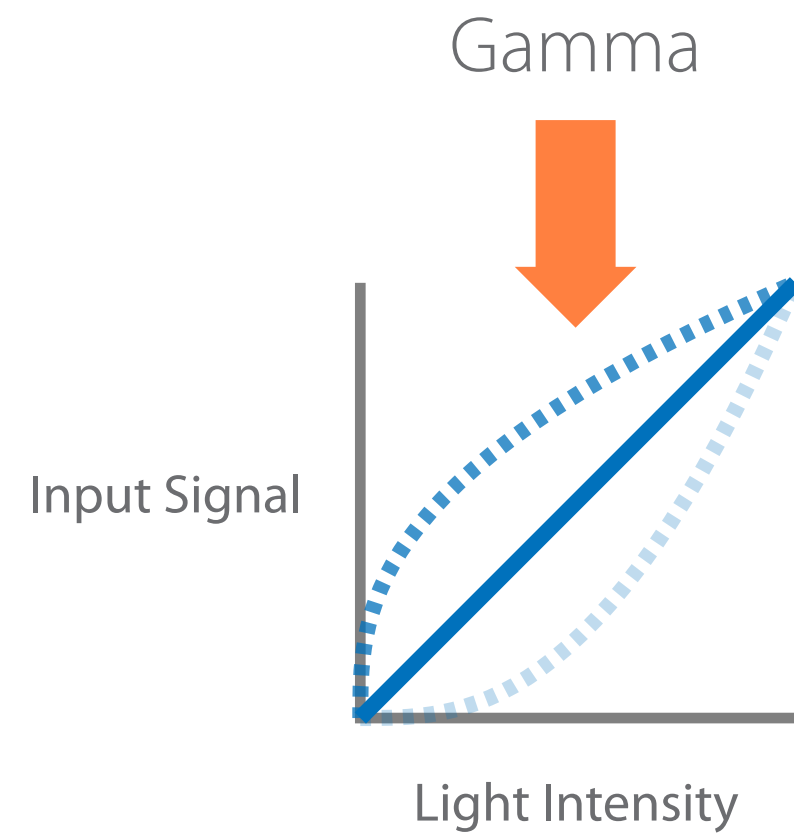
What is Gamma?

Compensation is added to make it linear again



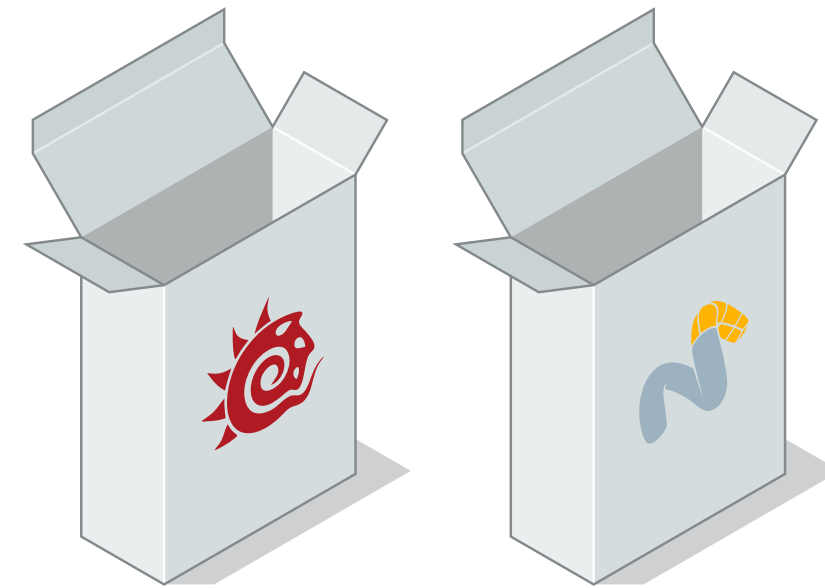
What is Gamma?

The numerical value of this exponent is given the name Gamma



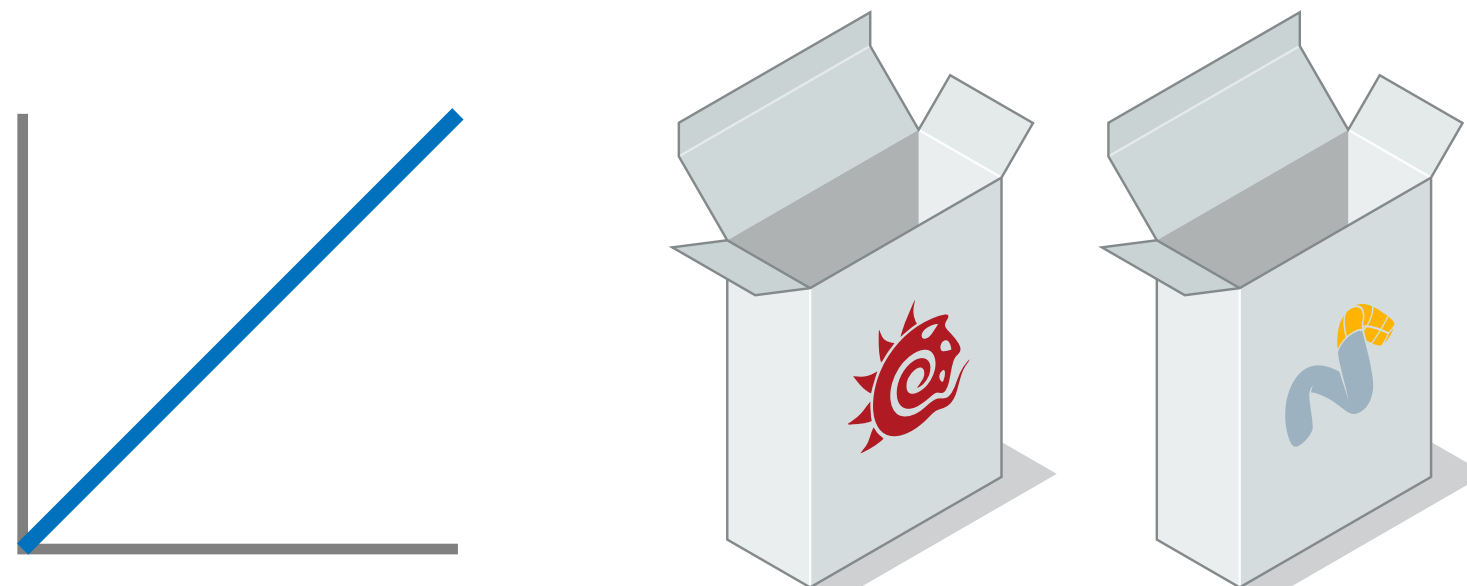
What is Gamma?

How does this affect 3D applications?



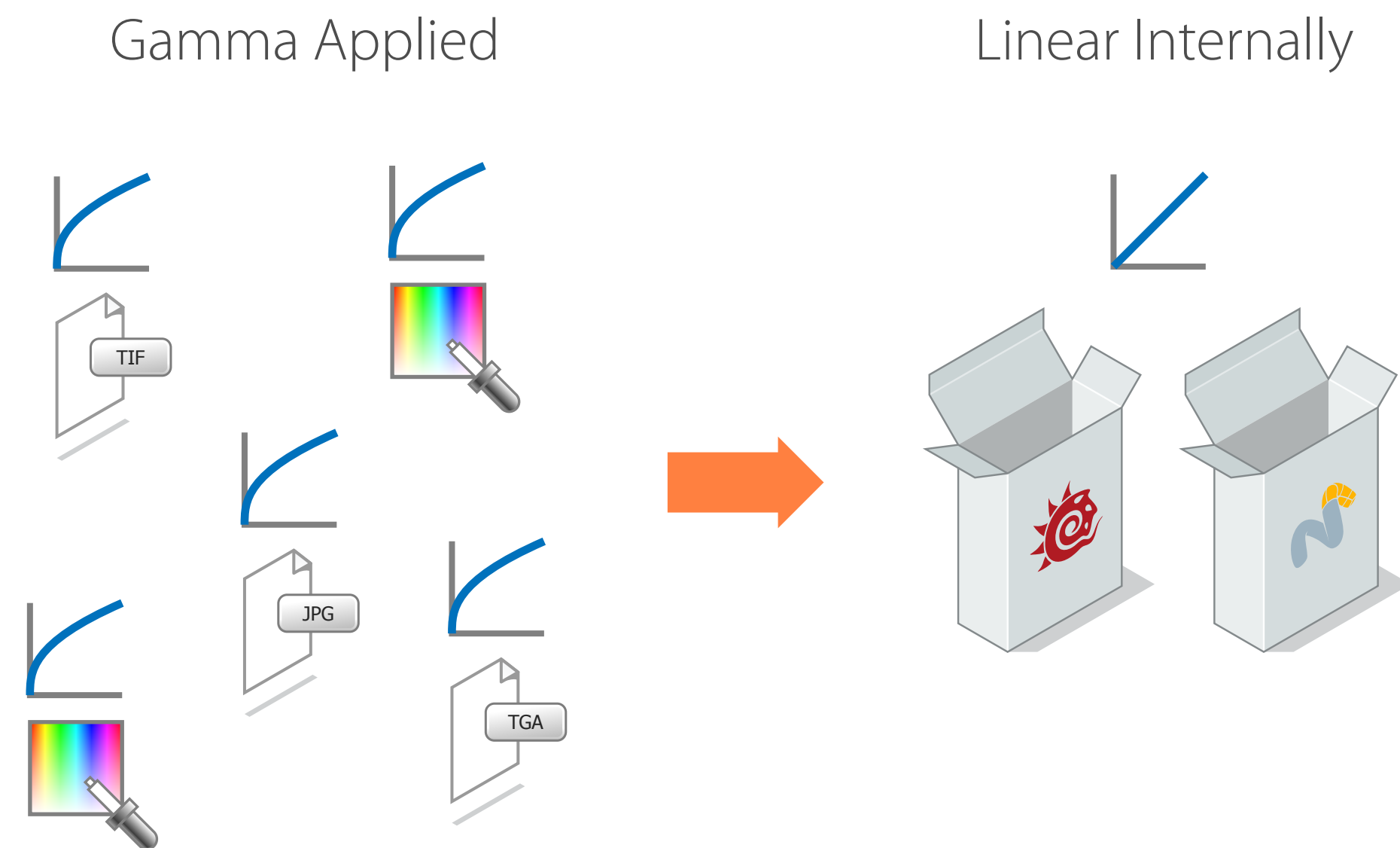
What is Gamma?

Floating point render engines like LightWave and modo work in linear space internally



What is Gamma?

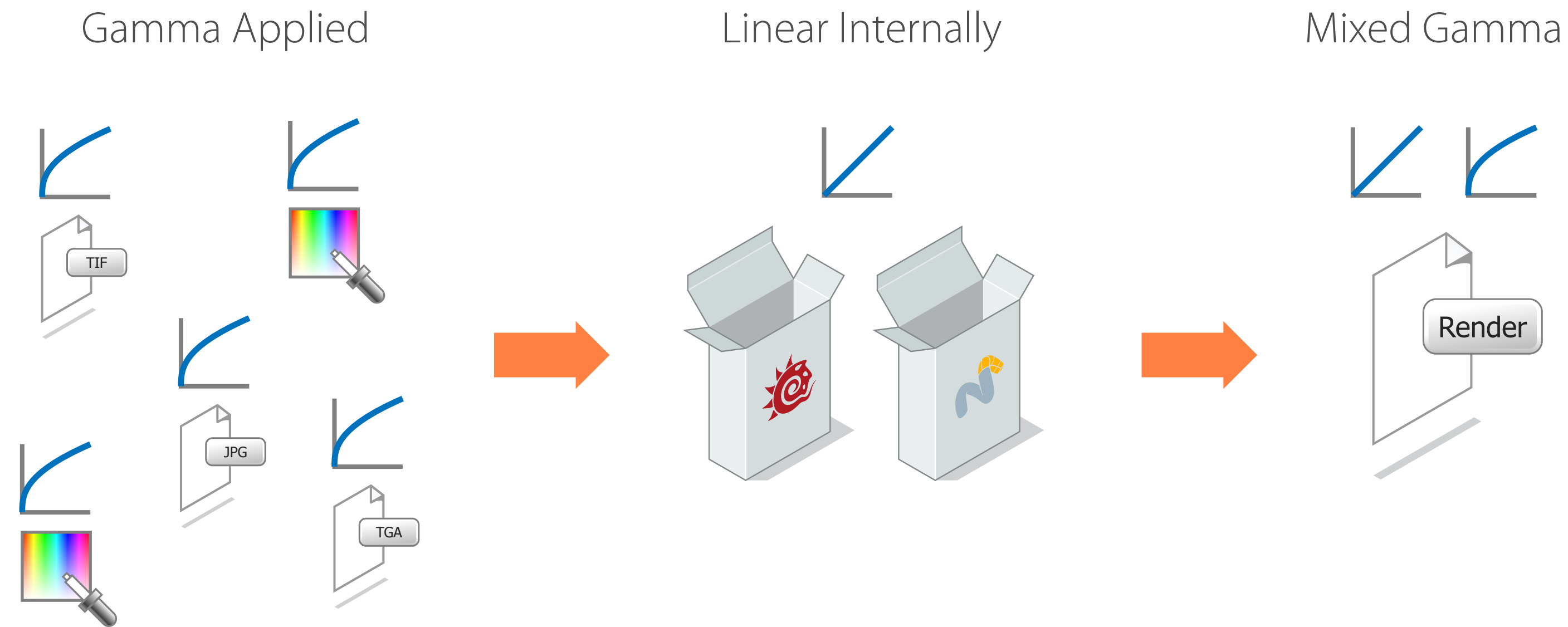
But texture images and colour pickers already have gamma applied so they can be seen properly on screen*



* This doesn't apply to HDR image formats, as they are in linear space
Some colour pickers can remove gamma from picked colours (e.g. Jovian for LightWave)

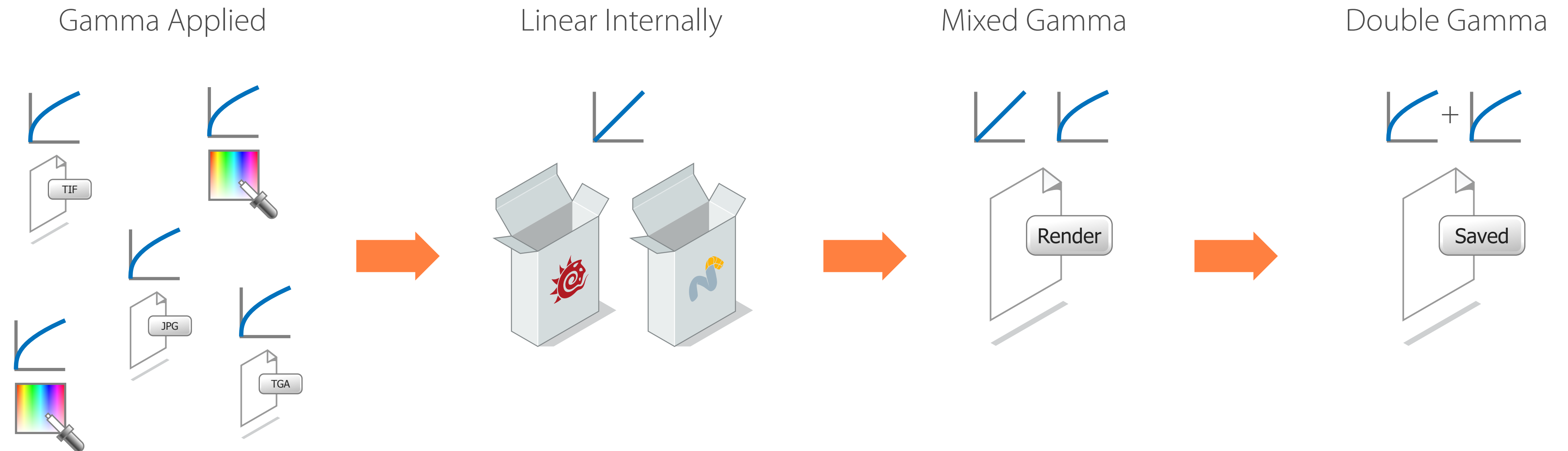
What is Gamma?

Which means the resulting render has elements with mixed gamma



What is Gamma?

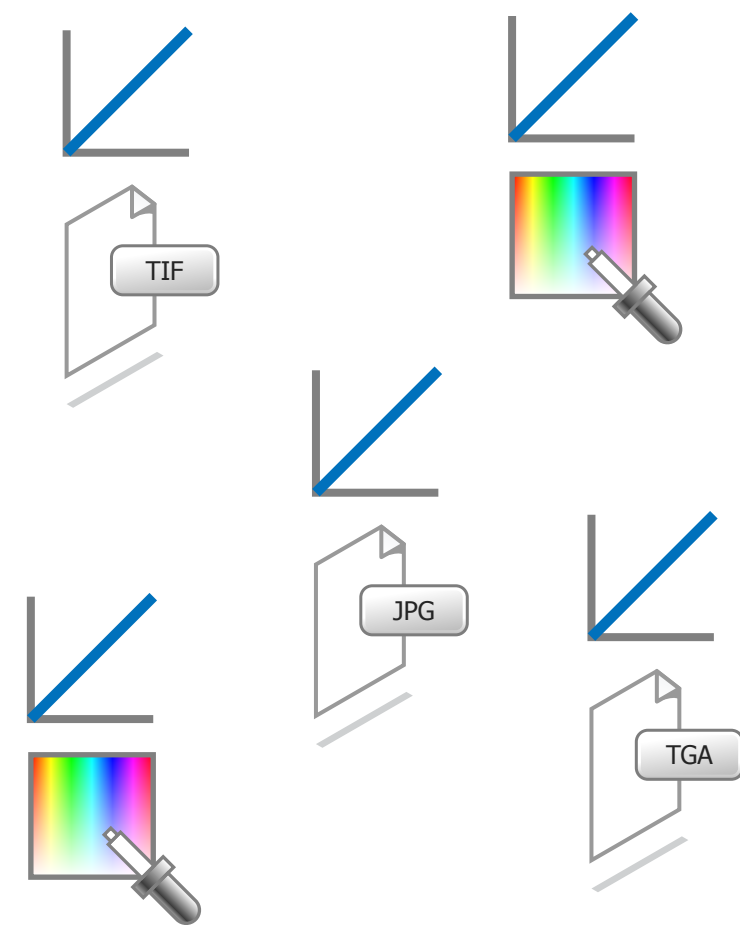
If you don't de-gamma textures and colours, but apply gamma on the final image, you double the gamma on the textures and colours that already had it, making them look washed out



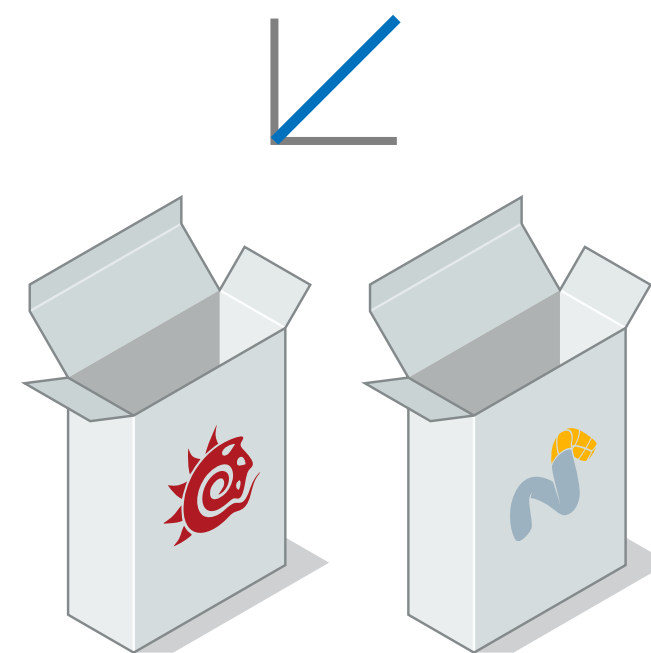
What is Gamma?

The trick is to de-gamma the images and picked colours

De-Gamma (1.0 / Target Gamma)



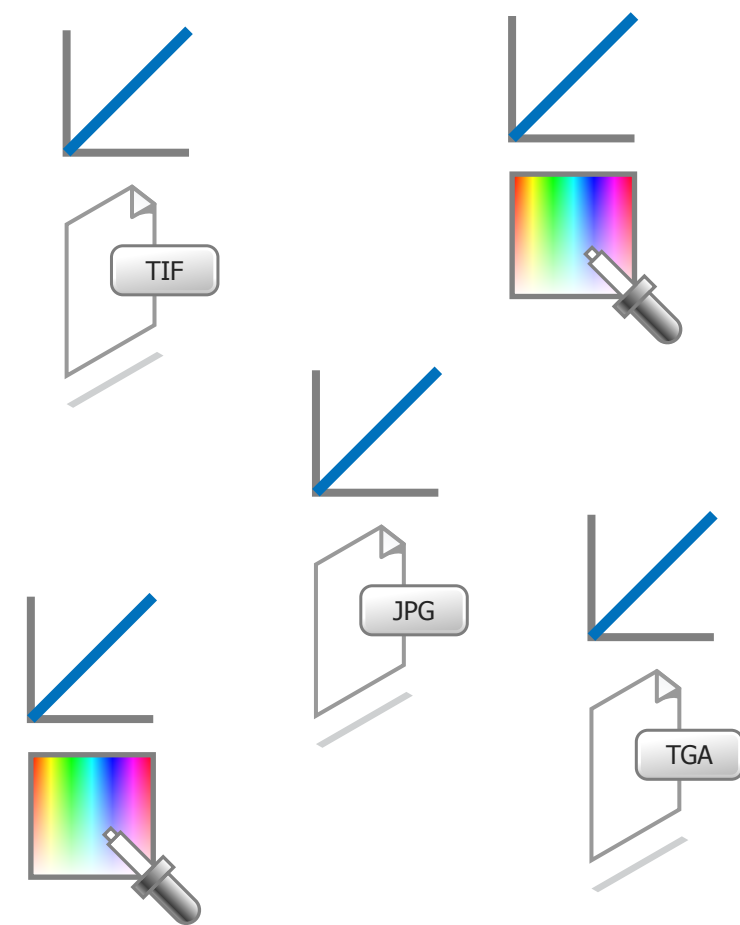
Linear Internally



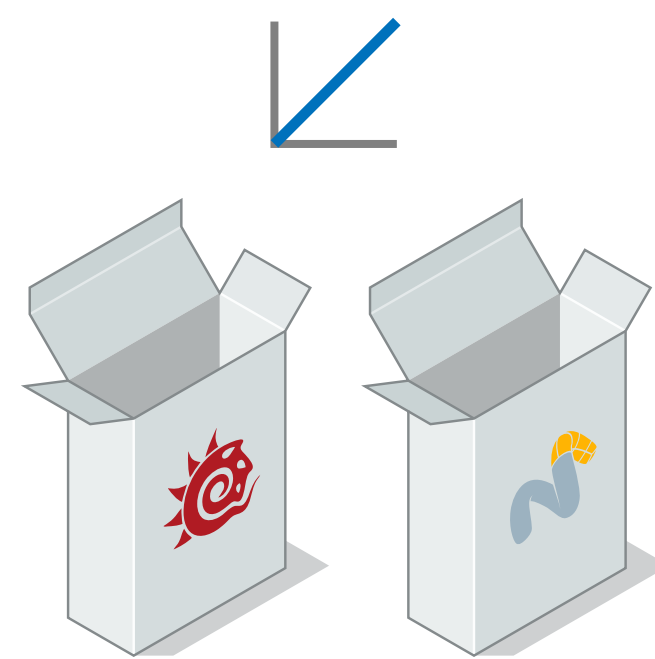
What is Gamma?

This is so everything remains in linear space throughout, this is called 'Linear Workflow'

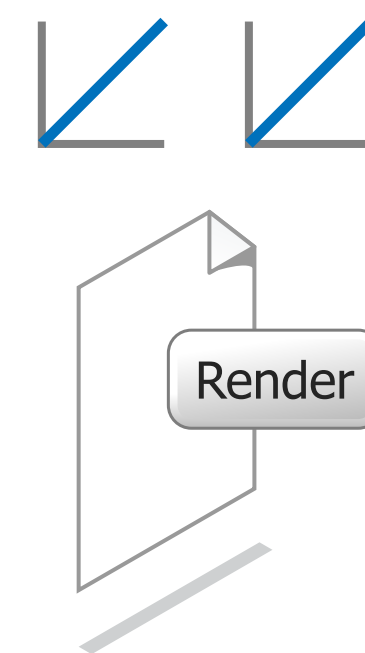
De-Gamma (1.0 / Target Gamma)



Linear Internally



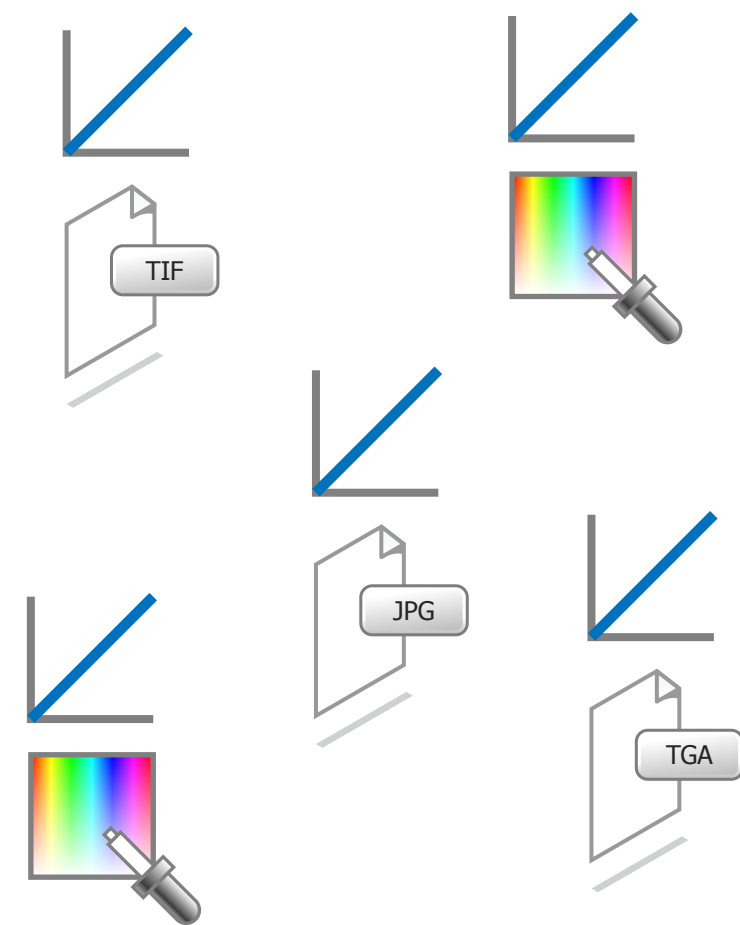
Linear Workflow



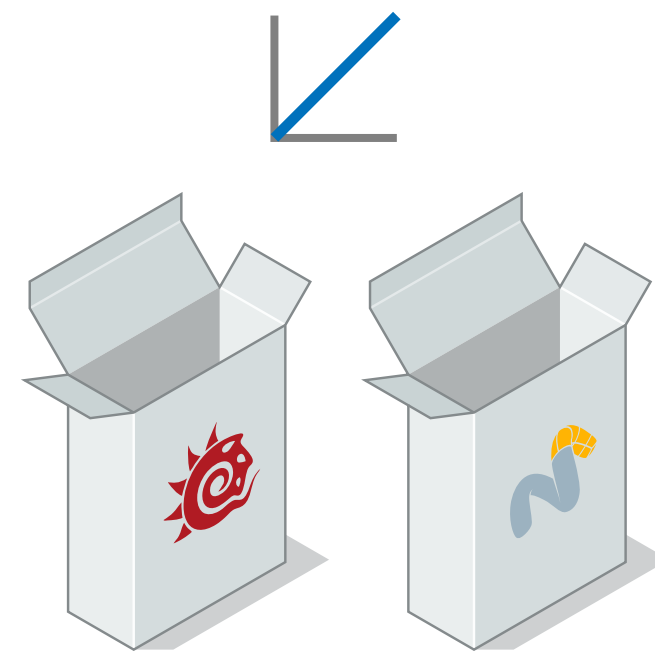
What is Gamma?

But you must apply your target gamma at the end so it displays it correctly on screen

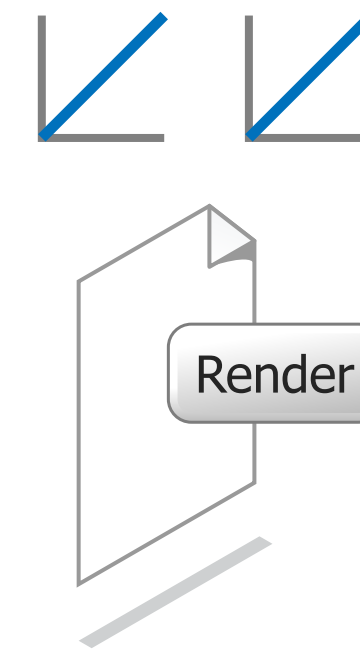
De-Gamma (1.0 / Target Gamma)



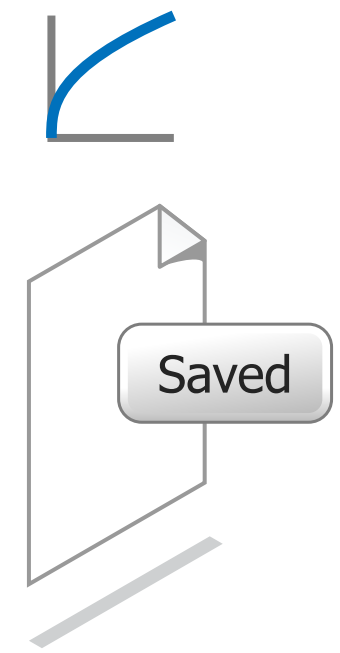
Linear Internally



Linear Workflow



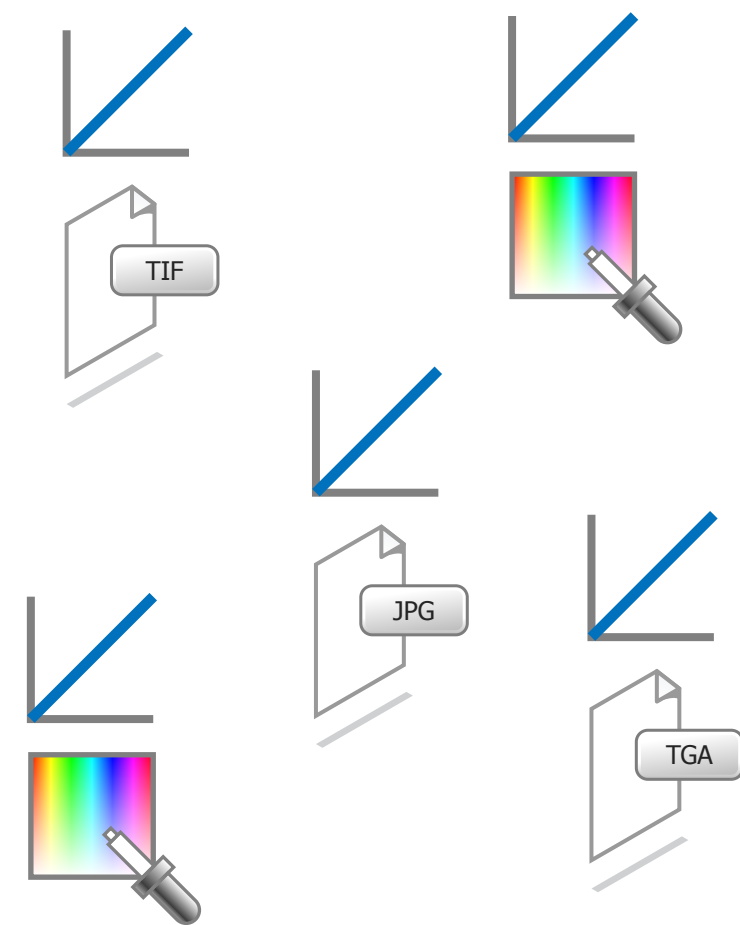
Apply Gamma



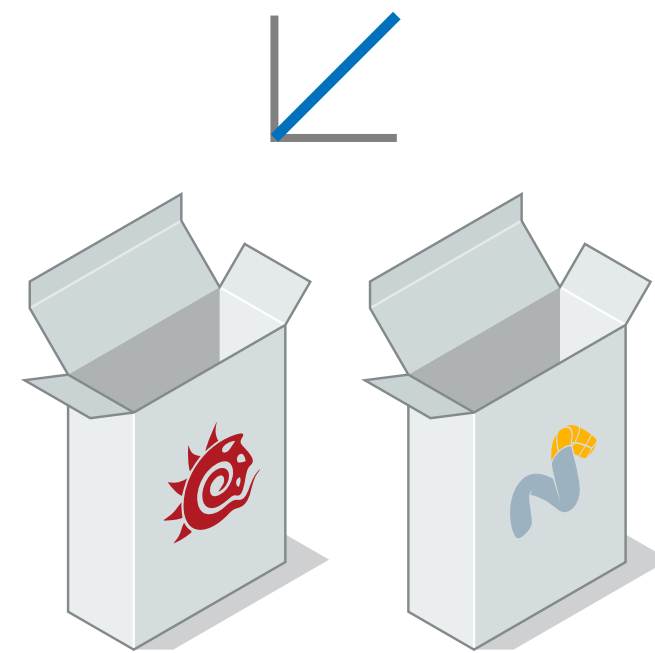
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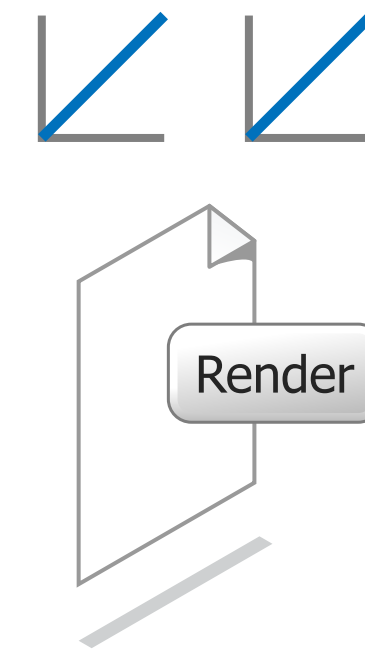
De-Gamma (1.0 / Target Gamma)



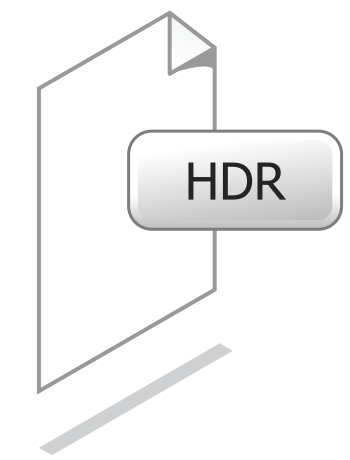
Linear Internally



Linear Workflow



Tonemap Instead



Uncorrected Render



Gamma Corrected



Gamma w/textures

