

POST-PRODUCTION HANDBOOK

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This handbook is about postproduction, that in our case I would like to redefine as that set of practices to modify the rendered image of a model, so no longer the thing itself, but its representation, we may say.

In this phase of the process we therefore act on the grid of pixels previously defined as render output, inserting in that matrix elements coming from other sources (*photomontage*) and altering the very nature of the pixels (*photo editing*). The software is Photoshop, useless to go around it. In the following pages you will find some tips and notes about the editing process on my work on the Vermeer's Music Lesson. Obviously it is not and does not want to be an exhaustive tutorial of the possibilities that you have using such a powerful software, but I hope with this guide to introduce and intrigue you to the topic, as well as showing you that even with a few steps you can get significant results.



The Music Lesson
Johannes Vermeer
1662-1665
oil on canvas
74.6 cm × 64.1 cm
Royal Collection, St. James's
Palace, London

The Music Lesson #64 azimuth
4° (no Lady at the Virginals , no
Gentleman)
FF



The image on the left is one of the many basic render outputs of the Vermeer Music Lesson, while on the right its transformation after some post-production work.





Beyond their structure - briefly explained in the Materials handbook - now we will see the practical use of render elements in the post-production phase.

As mentioned, when imported in Photoshop, every channel/render element becomes a layer, therefore giving the user the possibility to edit the output of the rendering.¹

Mainly these special levels are used to perform two functions:

1) create quick selection groups according to the lowest common denominator (same material, same position in space, ...) to perform individual actions (for example, I want to select all faces oriented to the east and increase their brightness? I will make a quick selection with the *magic wand* by selecting the planes with the same color in the *normal channel*)²

2) emphasize or decrease the effects resulting from a single rendering parameter; for example if I am not satisfied with the brightness of a particular light source, if the shadows are a bit flat, or if the reflections are excessive and I want to dampen them, I will import the relative render element and play with the blending options (as shown in the next pages).

¹ Note that Render elements require additional storage when rendering and thus increase the amount of RAM taken during the rendering.

² Note that if you export them all together they will be read as channels once imported into Photoshop, for the distinction between layers and channels please refer to Adobe Photoshop guide.

Here follows a list of the render elements I use most frequently, accompanied by an informal description of why.

1. alpha/background i.e. to quickly select the outside of a room, the surroundings of a building or "any part of the screen not modeled";

2. diffuse just flat colors and textures, excluding all the other material properties: very useful both for quick selections and to bring out a material in a flatter, abstract version if desired;

3. render ID extremely useful for quick selections: it assigns a different colored area to every object (surfaces or solids) in the scene;

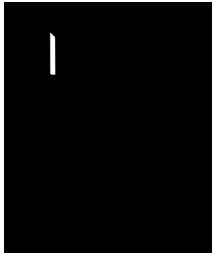
4. material ID: every material created with Vray creates a different area/color: useful for quick selections in which the user wants to select non coplanar object with the same properties;

5. raw light : The raw diffuse direct illumination before it's multiplied by the diffuse surface color, useful to highlight or decrease the light contrasts.

6. reflections: only the reflective parts of the reflective materials, useful to increase/decrease the reflections and obtains more or less realistic effects.

7. normals : to coplanar surfaces, even discontinuous ones, corresponds the same color (useful to select areas on which you want to insist to increase or decrease the depth effect, for example).

1



2



3



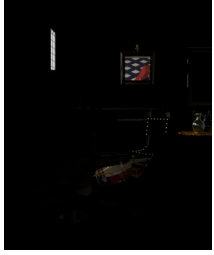
4



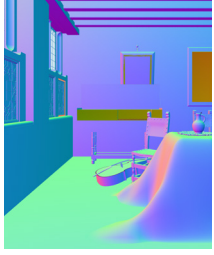
5



6



7



Blending options, in detail

Base



RGB (Normal)

As reported in the *Adobe Photoshop User Guide*, the blending mode (a feature specified in the options bar) "controls the way pixels in the image are affected by a painting or editing tool". As in most cases with PS, the best way to understand this set of commands is to imagine them transported to the real world, thus thinking in terms of layers of color on a canvas:

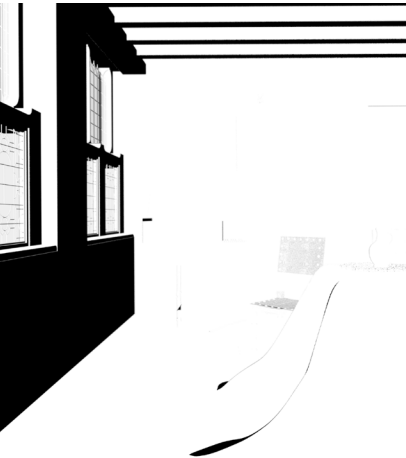
- The *base color* is the original color in the image;
- The *blend color* is the color being applied with the painting or editing tool on top of the base color;
- The *result color* is the color resulting from the blend.

Here follows a complete list of fusion methods, as described by the program developers, the modes signed with ** are those I use the most.

Blend Color



Reflections (Color Dodge 100%)



MatteShadow (Darken 30%)



RawGI (Overlay 100%)

Resul Color



- *Normal* **

Edits or paints each pixel to make it the result color. This is the default mode. (Normal mode is called *Threshold* when you're working with a bitmapped or indexed-color image.)

- *Dissolve*

Edits or paints each pixel to make it the result color. However, the result color is a random replacement of the pixels with the base color or the blend color, depending on the opacity at any pixel location.

- *Darken*

Looks at the color information in each channel and selects the base or blend color—whichever is darker—as the result color. Pixels lighter than the blend color are replaced, and pixels darker than the blend color do not change.

- *Multiply* **

Looks at the color information in each channel and multiplies the base color by the blend color. The result color is always a darker color. Multiplying any color with black produces black, while with white leaves the color unchanged. When you're painting with a color other than black or white, successive strokes with a painting tool produce progressively darker colors. The effect is similar to drawing on the image with multiple marking pens.

- *Color Burn*

Looks at the color information in each channel and darkens the base color to reflect the blend color by increasing the contrast

between the two. Blending with white produces no change.

- *Linear Burn*

Looks at the color information in each channel and darkens the base color to reflect the blend color by decreasing the brightness. Blending with white produces no change.

- *Darker Color*

Compares the total of all channel values for the blend and base color and displays the lower value color. It does not produce a third color, which can result from the Darken blend, because it chooses the lowest channel values from both the base and the blend color to create the result color.

- *Lighten*

Looks at the color information in each channel and selects the base or blend color—whichever is lighter—as the result color. Pixels darker than the blend color are replaced, and pixels lighter than the blend color do not change.

- *Screen*

Looks at each channel's color information and multiplies the inverse of the blend and base colors. The result color is always a lighter color. Screening with black leaves the color unchanged, while with white produces white. The effect is similar to projecting multiple photographic slides on top of each other.

- *Color Dodge*

Looks at the color information in each channel and brightens the base color to reflect the blend color by decreasing contrast

between the two. Blending with black produces no change.

- *Linear Dodge*

Looks at the color information in each channel and brightens the base color to reflect the blend color by increasing the brightness. Blending with black produces no change.

- *Lighter Color*

Compares the total of all channel values for the blend and base color and displays the higher value color. Lighter Color does not produce a third color, which can result from the Lighten blend, because it chooses the highest channel values from both the base and blend color to create the result color.

- **Overlay* **

Multiplies or screens the colors, depending on the base color. Patterns or colors overlay the existing pixels while preserving the highlights and shadows of the base color. The base color is not replaced, but mixed with the blend color to reflect the lightness or darkness of the original color.

- **Soft Light* **

Darkens or lightens the colors, depending on the blend color. The effect is similar to shining a diffused spotlight on the image. If the blend color (light source) is lighter than 50% gray, the image is lightened as if it were dodged., while if is darker than 50% gray, the image is darkened as if it were burned in. Painting with pure black or white produces a distinctly darker or lighter area, but does not result in pure black or white.

Blending options, in detail



• *Hard Light*

Multiplies or screens the colors, depending on the blend color. The effect is similar to shining a harsh spotlight on the image. If the blend color (light source) is lighter than 50% gray, the image is lightened, as if it were screened. This is useful for adding highlights to an image. If the blend color is darker than 50% gray, the image is darkened, as if it were multiplied. This is useful for adding shadows to an image. Painting with pure black or white results in pure black or white.

• *Vivid Light*

Burns or dodges the colors by increasing or decreasing the contrast, depending on the blend color. If the blend color (light source) is lighter than 50% gray, the image is lightened by decreasing the contrast. If the blend color is darker than 50% gray, the image is darkened by increasing the contrast.

• *Linear Light*

Burns or dodges the colors by decreasing or increasing the brightness, depending on the blend color. If the blend color (light source) is lighter than 50% gray, the image is lightened by increasing the brightness. If the blend color is darker than 50% gray, the image is darkened by decreasing the brightness.

• *Pin Light*

Replaces the colors, depending on the blend color. If the blend color (light source) is lighter than 50% gray, pixels darker than the blend color are replaced, and

pixels lighter than the blend color do not change. If the blend color is darker than 50% gray, pixels lighter than the blend color are replaced, and pixels darker than the blend color do not change. This is useful for adding special effects to an image.

• *Hard Mix*

Adds the red, green and blue channel values of the blend color to the RGB values of the base color. If the resulting sum for a channel is 255 or greater, it receives a value of 255; if less than 255, a value of 0. Therefore, all blended pixels have red, green, and blue channel values of either 0 or 255. This changes all pixels to primary additive colors (red, green, or blue), white, or black.

• *Difference*

Looks at the color information in each channel and subtracts either the blend color from the base color or the base color from the blend color, depending on which has the greater brightness value. Blending with white inverts the base color values; blending with black produces no change.

• *Exclusion*

Creates an effect similar to but lower in contrast than the Difference mode. Blending with white inverts the base color values. Blending with black produces no change.

• *Subtract*

Looks at the color information in each channel and subtracts the blend color from the base color. In 8- and 16-bit images, any resulting negative values are clipped to zero.

• *Divide*

Looks at the color information in each channel and divides the blend color from the base color.

• *Hue* **

Creates a result color with the luminance and saturation of the base color and the hue of the blend color.

• *Saturation*

Creates a result color with the luminance and hue of the base color and the saturation of the blend color. Painting with this mode in an area with no (0) saturation (gray) causes no change.

• *Color* **

Creates a result color with the luminance of the base color and the hue and saturation of the blend color. This preserves the gray levels in the image and is useful for coloring monochrome images and for tinting color images.

• *Luminosity*

Creates a result color with the hue and saturation of the base color and the luminance of the blend color. This mode creates the inverse effect of Color mode.

The image on the left blends the RawLight Render Element above the RGB channel (basic render) using different blending modes just explained in detail.

Photo editing : corrections, fixing mistakes



Analyzing one by one the few adjustments made on the image turned out to be an extremely useful operation for educational purposes, because it allows me to deal with different editing issues you may encounter during your post-production journey.

1. mirror: a whitish halo above the mirror reflection. The mirror was "too mirroring", so to make the blurred effect

typical of the antique mirrors, as in the painting, I created a layer on which I applied a white brushstroke and put it in 70% opacity to achieve the desired result (*blend mode normal*).

2. frame: wrong material IOR (check material handbook), I removed the white side reflections simply by copying with the *clone stamp* other parts of the frame.

3. chair lion heads: I refused to

model them because they were too small and compositionally irrelevant for the whole painting. I looked for a lion's head similar to that of the fine Dutch chairs of the period, distorted with *free transformation tool*, then played with overlapping layers of color to obtain the desired shade.



4. chair bangs: a minor forgetfulness: using the *smudge tool* as a brush to dilute water on a watercolor, then drooling the blue pixels of the chair on the space/pixels below, I obtained uneven bangs that followed the direction of my gestures. To do this kind of work I highly recommend the use of a graphic tablet.

5. cello "effe" detail : since I forgot to model this detail (it happens!) I took a picture



of a real "effe" and distort it according to the perspective, thus decreasing the opacity of the element to merge it with the rest of the cello (*blend mode: multiply*).



6. persian carpet: as mentioned in the materials manual, due to the particular texture of this carpet and the peculiar folds of the same, I decided to manage the texture in Photoshop.

So I created a *layer mask* tracing the surface of the carpet (red area), cut from Vermeer's painting the original carpet, then I pasted it inside the created mask and adjusted it following the slightly different folds that my model had.

The tools used were mainly the grid with the *transformation controls* and the *clone stamp*, plus some layers of bleaching and darkening brushes to enhance lighting effects, but I

will dedicate a special chapter to this topic.



7. marble tiles : a common mistake that emerges during rendering is that of treating a visualization model as a technical drawing. *Snap*s are such a great thing when working, but perfectly touching surfaces means no light passing through, therefore no shadows, and in the end everything will seem flat and fake if you don't try to emulate the little discrepancies, as it happens everywhere in reality. This is exactly what happened to the marble slabs of the floor of my model: so to overcome the problem of having a unique surface where they no longer stood out from each other, I decided to take the joints and trace them (with the help of construction perspective lines) with a white brush, and in some cases (as in the piece where the number 07 lies) to create a white or black area on a separate layer, then play with opacity to simulate a more worn surface (white spot), or slightly tilted against the light (black spot).

8. spot removals: textures with points that contrast sharply with the rest of the mapping, although seamless, can produce annoying repetitions when applied on large surfaces. In these cases the *clone stamp* or the *Healing Brush Tool* can come to the aid by sensing the pixels and removing repeated dots (it's a widely used tool to remove black dots and other imperfections in the photo-retouching of faces, if you think about it, the aim and so the procedure is exactly the same).

Photomontage, adding a background



By definition, "a Photomontage is the process and the result of making a composite photograph by cutting, gluing, rearranging and overlapping two or more photographs into a new image"¹.

¹ Clark, Lloyd Douglas; Brown, Brian A. "Apparatus and Method

When talking about photomontages, the most important factor to keep in mind is the coherence of the elements chosen to be inserted in your artwork, whether they

for Application of Selective Digital Photomontage to Motion Pictures"




are people (although this is not the case), inanimate objects, backgrounds or other stuff. Understanding and defining the expressive language with which you are working is fundamental to orient the choice of alien elements to insert in the picture.

In this case, being lucky enough to work with Vermeer (who in addition to many interior scenes also produced a couple of exterior views) in creating a background for the counter-field I inserted his view of Delft.

Therefore, by introducing an element in harmony with the painter's style I didn't risk to produce a cacophony, as probably would have happened by inserting a real photograph (obviously without retouching

it very much, therefore wasting a lot of time and in any case not reaching the painter's masterly verisimilitude).





in the previous page, The Vermeer's Music Lesson, camera variation: reverse shot Filippo Fanciotti, 2017

in this page:

1. detail of the reverse shot without the photomerged background.
2. Details of the windows.
3. Johannes Vermeer, view of Delft, 1660.





This is without a doubt the most difficult part of these five handouts to explain. The reason is that it is the one, pass me the word, more artistic, less procedural and strongly influenced by your personal sensitivity, taste and accumulated experience.

The strange image on the left is an exportation of all the layers of effects applied on the top of the image, after the adjustments shown in the previous pages. This package of actions is aimed to change, we might informally say, its *patina*, although technically we are ageing altering the simple appearance of its pixels.

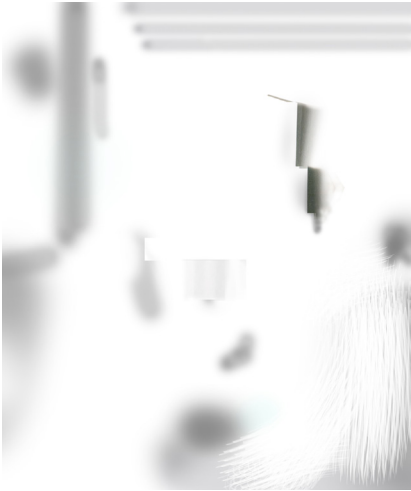
The truth is that these are layers of colour, black and white brushstrokes, in some cases imported images placed in opacity above the other layers, all combined with blending modes designed ad hoc to achieve a very personal expressive purpose, a kind of pictorial effect, which I share with you here as an example, but with the invitation to distance yourself from it and experiment until you find your own; search for brushes in the web, use them as if you are painting, play with layers and blending options, ...

Below you will finally find four different types of operations, with an excerpt here on the side and the isolated effects package:

- 01. light and shadows;
- 02. color nuances;
- 03. filters;
- 04. adjustments.



01 lights and shadows



02 colour nuances



03 filters



1. *light and shadowss:*

normally I create a layer (or even a folder of layers) of brushstrokes in which I enhance lights and shadows in the painting. Sometimes - just like in the example here - I directly use black and white, sometimes with the eyedropper I sample a pair of colors (normally a light one, such as golden/yellow and a dark one, such as a dark brown), then I set the blend mode of the layer to *Soft Light* and I start playing with brushes, hightlighting some parts of the composition. Here you can see that I wanted to highlight in particular the shadows behind the mirror, so in that area I used the brush with an opacity of almost 100%, in other parts I wanted to do the same, but with less intensity. Generally I never shade with an opacity greater than 40% black, while for highlights I can reach even 60%. Anyway, I play with the layer opacity and the superimposition of layers of operations like this until I get the desired result. About the brush, in 99% of cases I simply use the very basic *Soft Round Pressure Opacity Brush*.

2. *colour nuances:*

from a technical point of view the process is very similar to the one just described, with the difference that I no longer think for single elements (shading a pitcher, the back of the carpet and so on), but for areas of colour; what I want to emphasize here, in fact, is the temperature of the light or, more improperly, the atmosphere. Generally - and this example is no exception, although I was only emulating what

emerges from the analysis of the light in the painting - I use complementary colours: orange stains where the light touches the surfaces, blue spots in the shaded areas.

3. *filters:*

we could open a very long parenthesis on the use of filters in Photoshop (I don't know if you've ever tried to explore the *filter gallery* or download *actions* from the web), if not, take a look at it: you will discover a very wide world of options among the most diverse (some exquisitely kistch) with which to experiment and, above all, to learn to distance yourself quickly. I am not going to deal with this issue here, I will instead confine myself to share what I've done here, confessing that it's more or less what I do in most situations. usually I take a piece of dirty and aged paper, or a worn canvas, even better if with a lot of irregularities, I extend it to cover the whole size of the painting, and then I start to modify it with the clone stamp and other tools (in short, if there are stains, I want them to be where I want them to be). the success of the effect is given to the use of a proper *blending mode* or, like in this case, to the combination of different papers with different blending modes.

4. *adjustments:*

these special layers applie color/tonal adjustments to your image without irreversibly changing pixel values. The difference between making an alteration directly on the layer (with interventions

such as correcting curves and so on) and doing so on one of these dedicated layers is that the changes are stored only in the *adjustment layer* and apply to all the layers below it. In this way you can both correct multiple layers by making a single adjustment, rather than adjusting each layer separately, with the help of a *Clipping mask*.
- Nondestructive edits are the main advantage you have by using this tool, which means you can re-edit the adjustment layer at any time, as well as reducing the effect of the adjustment by lowering its opacity.
- Selective editing is the second big advantage: you can paint on the adjustment layer's mask to affect only a part of the image, even varying the adjustment by painting on the mask with different tones of gray. The adjustments in this image (check the screenshot on the right) are the ones I use the most, which are:

- Brightness/Contrast increases tonal values and expands image highlights, or decreases values and expands shadows. The contrast slider expands or shrinks the overall range of tonal values in the image.

- Hue and saturation Adjust the *hue*, *saturation*, and *lightness* of a specific range of colors in an image or simultaneously adjust all the colors in an image through three different sliders.

- Vibrance increases the saturation of less-saturated colors more than the colors that are already

saturated, therefore avoiding oversaturated areas.

1. Levels

correct the tonal range and color balance working on shadows, midtones, and highlights. The *Levels histogram* is a visual guide for adjusting the image key tones. Moving the *black input slider* maps the pixel value to level 0, while moving the *white point slider* maps the pixel value to level 255. The remaining levels are redistributed in between. This redistribution increases the tonal range of the

image, therefore affecting the overall contrast.

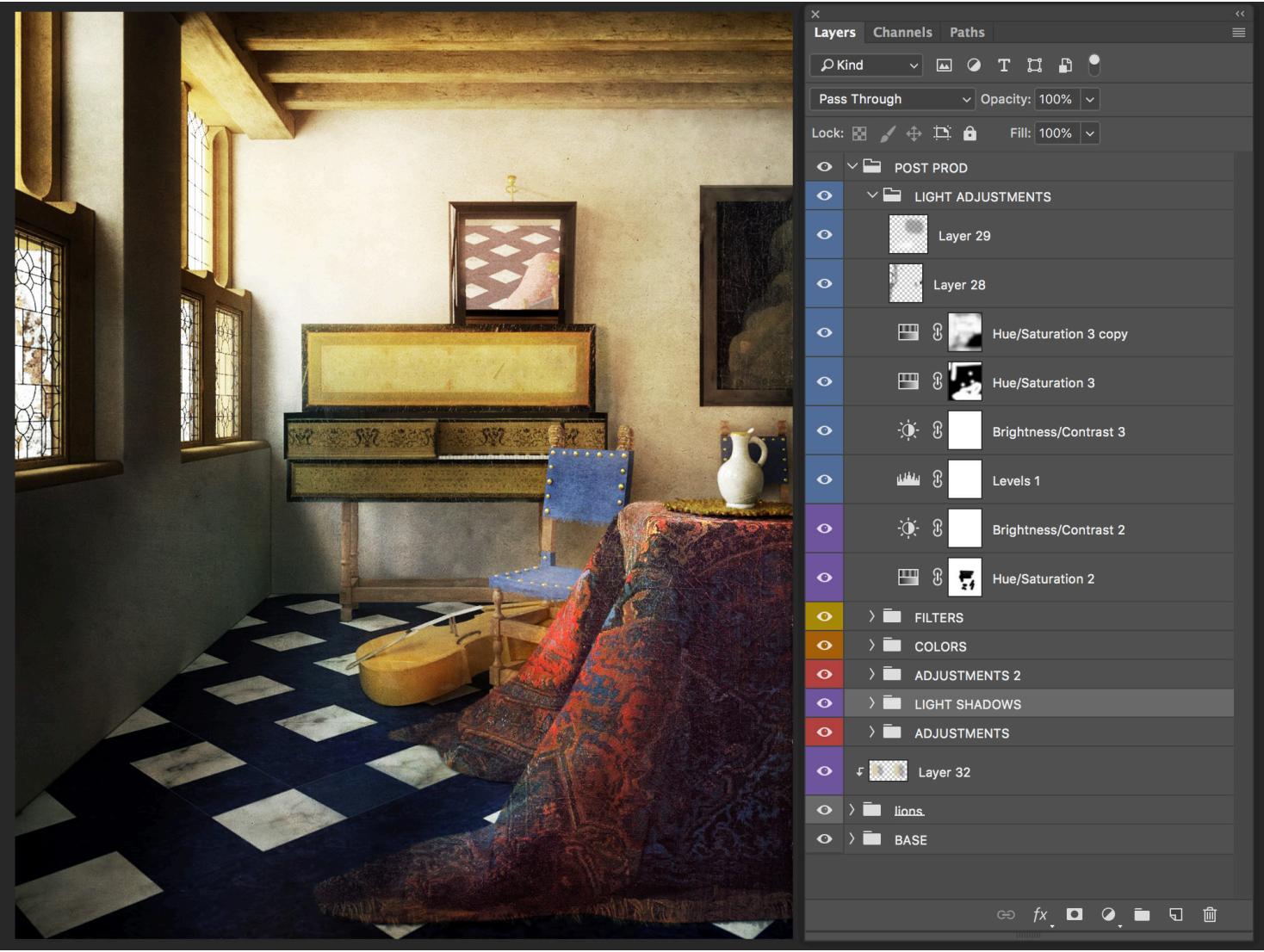
The *middle Input slider* adjusts the gamma. It moves the midtone (level 128) and changes the intensity values of the middle range of gray tones without dramatically altering the highlights and shadows.

- Curves

Initially, the image's tonality is represented as a straight diagonal line on a graph. When adjusting an RGB image, the upper-right area of the graph represents the highlights and the lower-left area represents

the shadows. The horizontal axis of the graph represents the input levels (original image values) and the vertical axis represents the output levels (new adjusted values). As you add control points to the line and move them, the shape of the curve changes, reflecting your image adjustments. The steeper sections of the curve represent areas of higher contrast while flatter sections represent areas of lower contrast.¹

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1 for the Adjustment layers, I used as source the online Adobe Photoshop Userguide.



04 adjustment layers

