Should Salons be Allowed to Resize Images?

The author examines some of the aspects affecting the issue of permitting or prohibiting a salon from resizing images.

Issue 2.3

With respect to digitally projected images, both the PSA and FIAP Exhibition Standards contain two very important rules, the effect of which is sometimes not fully understood by either the salon organizers or the entrants. These relate to the percentage at which an image is viewed during selection and the prohibition against the salon resizing an image before or during selection and award determination. Resizing can be either implicit via the projection process or explicit (perhaps via Photoshop). A salon is allowed to resize the images after the selection and award process for catalog and exhibition purposes, but not before.

Note - we are not concerned with any resizing or other processes which the entrant applied to the image prior to submission - we are only concerned with what is done after submission and out of the entrant's control.

Let us examine the process and the components involved in projecting an image.

Firstly there is the original image. For most salons, the image will have been stored in a computer file in the JPEG format. The file contains details which specify the width of the image in pixels, the height of the image in pixels and the actual content to be shown in each pixel. This is effectively a large two dimensional graph with the colour of each cell being specifically defined. It is recognized that the JPEG format may have lost information during the *storage* process but when the image is opened for viewing, there is no ambiguity and the colour to be stored in each pixel is tightly defined. We must assume that the entrant has opened the JPEG and is satisfied with the resulting image when viewed at 100%. That is what the entrant submitted.

When the image is opened inside the computer it is always at 100%. By this we mean that if the image is 1400 pixels by 1050 pixels in 8 bit RGB, then the computer will have had to allocate 4,410,000 (1400*1050*3) bytes or storage elements.

It is always necessary to view the image via a program such as Photoshop, PaintShop, Lightroom, Aperture, etc. Nearly all such programs will have some control or display showing the percentage at which the image is being viewed. This is the first point at which the image can be distorted and resized.

If the control is say 50%, this means that the display software has taken a copy of the original data and resized the copy to one quarter of the original size. Each pixel displayed therefore represents 4 pixels of the actual image. There is no hard rule about how the 4 pixels are combined to show one colour.

Some software programs will merely sample one of the pixels and ignore the others, other programs may average the four pixels. But what if the control is set to 49%. Each pixel displayed will represent not exactly 4 pixels of the original but 4 and a bit of the next, then a bit of one of them, 4 more pixels and a bit more of the next in a progressive pattern in two directions.

Again, some algorithm will be used to determine the colour displayed using sampling or averaging and sometimes averaging and sampling together. The one thing that is certain is that unless the original image contained only one colour, the display will not be an accurate representation of the original image - some distortion of colour and loss of detail will have taken place.

What if the control is set to more than 100%, say 125%. The first displayed pixel will contain the information from the first original pixel. However, the second displayed pixel will overlap part of the first and part of the second - what colour should it display? A majority sample? A weighted average? Again there is no defined rule - each piece of software is free to adopt whatever algorithm it wants.

If you think this is irrelevant and that the software does not distort the image, then please download one of our special images www.kenebec.com/pov/50 percent and open it in Photoshop. Using the Navigator palette or the status window, set the display to 50%. Now change that to 51%. The display software is using different processes at different percentages.

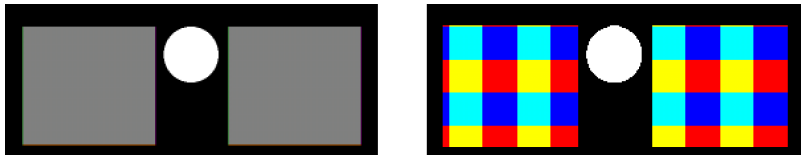

Image viewed at 50% (left) and at 51% (right) in Photoshop

The only time when there is no distortion produced by the software occurs when the control is at exactly 100%, 200%, 300%, etc. At these points and only at these points, each display pixel can be determined by looking at exactly one and only one of the original image pixels.

But the software does not in fact display the image. It sends the information to the graphics card. What information? The colours of the display pixels. As we have noted above, unless this is at 100% (or 200% etc), the colour information of the display pixels passed to the graphics card will not be an accurate representation of the original pixels. The graphics card does not know this and will store whatever is passed to it. But the graphics card does not actually display the information - that is done by the screen, the projector or TV, etc.

Depending upon the type of graphics card and the type of display device, some more resizing and distortions can occur either in the graphics card or the screen / projector or both.

All digital display devices (such as LED screens, digital TV's and digital projectors) have a *native* resolution. This defines the number of individual display cells in the device. For example a 1600*1200 screen has 1600 columns and 1200 rows for a total of 1,920,000 individual cells each of which will display one and only one colour. The number of cells is not affected by the size of the screen. A 12" 1600*1200 screen has exactly the same number of cells as a 23" 1600*1200 screen - the cells are just smaller. There may be special features in the larger screen to blend the cells perhaps even with some form of interpolation between them but this is at the device level - the number of addressable cells remains at 1,920,000.

With many display devices, such as computer monitors, you can specify in the control panel that the *display resolution* is something other than the *native resolution*. For example, you may have a 1600*1200 screen but you have set the display resolution to 1280 by 1024. This does not change the characteristics of the device - it still has 1600 by 1200 cells. It will however, change the amount and layout of the information in the graphics card. There will now be only 1280 columns and 1024 rows which the display program can address and colour.

But what is displayed on the screen or projector or TV? This will depend upon the settings and nature of the display device and the degree and direction of the mismatch between the *native resolution* and the *specified display resolution.*

Advanced devices will give you various options so you can control the output effect - cheaper devices will merely use a factory pre-set which can result in bad distortions.

If the *native resolution* is larger than the *specified display resolution* (e.g. device is 1600 by 1200 but the control is set for 1280 * 1024), then there are three options.

1) The device can use only part of the screen mapping the image information one to one with its pixels and leaving a black area around. This is a good option since there is no distortion and no alteration of the image.

2) The device can expand the image proportionately to fill the screen in one of the directions, leaving a black area in the other direction. This is often seen in films on TV during the credits or titles. This option maintains the shape of the structure but destroys the colouration and sharpness of the image.

3) The device can expand the image disproportionately so that the image fills the full screen. This means that the horizontal

Options if Native Resolution Larger than Specified Resolution

direction is expanded to a different degree to the vertical direction. Circles become ovals, faces become fatter (or thinner) - everything is distorted in structure. This is the worst option since not only does it destroy the colouration and sharpness of the image but it also distorts the shapes in the image.

However, if the *native resolution* is smaller than the *specified display resolution*, (e.g. your projector is 1400 by 1050 but the images are 1920 by 1080) the device again has three options - none of which are good.

1) The device can merely clip the image and display only part of the image. The clipping pattern could either center the image and clip all around or align one or more of the edges and clip the opposite side. Bad option

2) The device could shrink the image proportionately until one of the dimensions is the same as the device dimension and fill the other area with black. However, this will lose detail in the image and alter the colouration and sharpness.

3) The device could shrink the image disproportionately and fill the screen. Again, this is the worst option as it destroys the colouration and sharpness, loses detail and distorts the image.

Options if Native Resolution Smaller than Specified Resolution

Destroys the colouration and sharpness? The digital projection device cannot change its physical dimensions. If there is a mismatch between the physical *native resolution* and the *specified display resolution* then most of the physical pixels in the display will be coloured with a blend or average or sampling of two or more of the original pixels. By definition, this means that what is being displayed is not what was received from the entrant.

Sharpness in projected images needs to be carefully controlled by the image maker in order to produce the desired effect without becoming too heavy or obvious. Any change in size or colouration will alter the effect that the entrant has created.

It should have become obvious by this point that the only way to view the image as intended and submitted by the entrant is to use a viewer which displays the image at 100% to a sufficiently large graphics card which is communicating with a display device whose *native resolution* is the same as the *specified display resolution* and whose *native resolution* is no smaller than the original image pixel dimension and which has been set-up or controlled not to expand or shrink or clip the image. If all of these are correct, then every pixel of the original image controls the colour of exactly one and only one pixel of the display device.

Any deviation from this pattern means that the structure, colour and sharpness of the image are being altered.

But what if the salon, resizes the images before projecting them? Perhaps the salon has requested very large images but only has a small projector and decides to perform a batch process of resizing the images. Unfortunately, there is no way to accurately reduce the size of a digital image. If the resulting image is smaller than the original, then information has been lost.

The pixels in a digital image hold discrete values. A pixel cannot have multiple colour values. If the image was 1400 by 1050 and is now 1024 by 768, then information has been lost. The original image was described using 1,920,000 separate colour points; the reduced size image has only 786,432 colour points.

Not only will information have been lost, but the resulting image may look quite different. The colours will have been merged and the sharpness will have been changed. There are many different ways of downsizing an image but by definition, none of them can be accurate. Bilinear tends to soften an image; the mathematics of bicubic resizing always applies an uncontrolled unsharp mask effect, Lycos resizing creates a sharpness and edging which was not there in the original.

Which brings us back to the original question - should salons be allowed to resize submitted images prior to or during judging. Again, before answering this question, we may want to ask why would salons ask for images for a digitally projected competition which are larger than the equipment to be used for displaying the image?

Upon asking various salons which were requesting large sizes or requesting *minimum sizes*, the answer was nothing whatsoever to do with digital projection. All of the salons questioned stated that they, the organizers, wanted large sizes for printing the images either in the catalog or for printing as part of a gallery exhibition or for printing as part of the judging process. None of the salons questioned appeared to care about the fact that the entrants were entering a Digitally Projected competition and thereby expected the salon to treat their images with respect.

This is why it is critical that the salon accreditation process stresses and ensures that each salon must indicate the equipment to be used for displaying the images and that the image size requested must not exceed the dimensions of the display equipment and that images are viewed at 100%.

If you feel that all of this is not really of concern, please download our image www.kenebec.com/pov/check_pattern Open it in Photoshop and then using the zoom tool, change the percentage from 100% downward (control-). Then alter the screen resolution and do the same again and look at what happens to the image at anything other than 100% throughout. Patterns and colours will appear, change and disappear.

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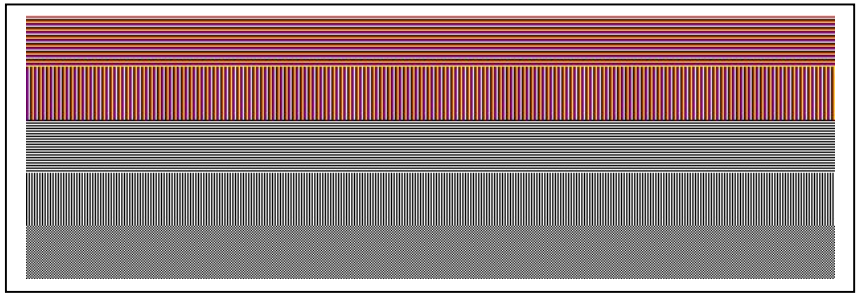
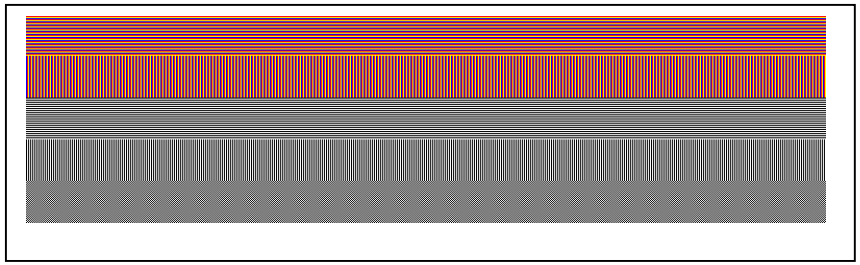
This is the *check_pattern* image mentioned above. In each of these boxes the same image is presented but at varying percentages. You will notice that it appears different at different percentages.



The same distortions happen with image details when any part of the projection process is not at 100%. For some images it may not be significant but for others it can destroy the entry.



Now, using the PDF controls (or your fingers on an iPAD), change the percentage / size of this document and look at what happens to the images.

Now ask yourself - with respect to selection - should salons be allowed to resize submitted images either explicitly or implicitly?

The rules and regulations are there to protect the entrant. Although most entrants may not be aware of the finer points of the standards, there is an implicit trust in the process. Therefore, when a salon displays an accreditation logo with the words *in accordance with the standards*, the entrant has a right to expect adherence to a process which will not distort their images.