

Lighting for Digital 3

Dave Montizambert looks at *Metering* – a lost art?



My last article ended with a real “Who killed J.R.?” cliff-hanger – “What exactly is middle grey and how does it function within digital?” To answer those questions we need to look back into photographic history.

In the early days of film, an exposed sheet of film would be pulled from the processing chemistry and looked at against a dim green safelight - earlier films were orthochromatic rather than panchromatic and so were not particularly sensitive to green light - if the density looked adequate it was done, if not, then back into the soup it would go. Each sheet of film could be custom processed this way. However, when Kodak wanted to introduce roll film, this method of custom development had to be rethought since multiple images would need to be processed at the same time and so exposure would have to be standardised – one processing time for multiple images requires a standardised exposure method. Kodak realised that if they were to make this work, they would have to create a standard intensity to base all exposures from - a central starting point to set the tonal contrast of a scene or subject. Years ago Kodak found such a tone – unfortunately not from some ancient Egyptian tomb or from aliens either, nothing exciting like that, but instead with some really dull tedious basic arithmetic and a very sharp pair of scissors. To ‘find’ this magic tone they took an average image, cut it into 1000 segments, took the average density of each segment and then averaged the 1000 readings together. They repeated this over several thousand images until it was way past their bedtimes. And do you know what tone the average tonality of 10,000 standard images was? Middle Grey, 18% grey, Zone 5, Value zero, 0.70 density, or whatever you like to call it, in other words it was the mid-point between white and black, (see Image [2] - mid-

grey on Macbeth card & Q14 grey-scales).

The concept is, if you expose middle grey so it lands at the mid-point density of your film, then all other brighter and darker subject tones will fall into place relative to that mid-tone resulting in a correctly exposed subject.

And now to answer the question you are burning to ask, “I don’t shoot film anymore so why and how do I use middle grey with digital?” Middle grey is a standard tone that we can use for both film and digital to ensure accurate exposures and tone prediction. A really simple way to ensure correct exposure of a RAW digital capture is to include a grey-card or grey-scale in your image. A correctly exposed middle grey tone in a RAW capture (once brought into your RAW processing software), should read 113 to 118 levels in all three channels in a 2.2 gamma colour space such as Adobe RGB or sRGB IEC61966-2.1, and should read around 94 to 99 levels in all three channels in a 1.8 gamma colour space such as ProPhoto RGB or ColorMatch RGB. These figures are for RAW files and assume that all adjustment sliders in your RAW processing software are set to zero and that the tone curve, if your software has one, is set to its straight diagonal 45 degree line (no bendy bits). Once you have created the optimum exposure that we have objectified with the above figures, you can now set the process settings to whatever you want, knowing that you have the very best cache of digital image data to pull from. Ultimately we want to have it so that with accurate metering practices, a reading off a grey-card or an incident meter reading of the light striking the subject automatically gives us a setting that would render a grey-card, were it present in the image, to 113 – 118/94 - 99 levels in our RAW capture software with zeroed settings.

To set exposure with a hand-held reflective meter reading off a grey-card/patch on the subject plane, can be a problem. The problem is specularly or glare from the main-light bumping up the reading resulting in under-exposure.



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MAKE YOUR OWN INCIDENT METER

You can actually make your own incident meter from a reflective meter. Here’s how: set-up a grey-card, take a reflective meter reading off its surface, (see Image [3]), remember this reading, then orientate the back of the meter towards the grey-card so that its receptor is pointing directly at the light source you want to read (see Image [4]). If you should happen to take a reading at this time, it will read much higher than the reflective reading off the grey-card. Now hold a piece of white paper tightly against the meter’s receptor so that the light has to pass through the paper to hit the chip, (see Image [5]). Take another meter reading with the paper-covered receptor pointing directly at the light source. If the reading still does not match the reflective reading then fold the paper over and try again. Fold the paper over as many times as necessary until you have added enough density over the receptor that the two readings are equal. Now the paper is absorbing as much light as is the grey pigment coating the grey-card and it is this fact that makes it possible for an incident reading of the light striking an area to read the same as a reflective reading off a grey-card, only without a grey-card - what a convenience! Better yet, forget the white paper, the white incident dome that comes with your light meter does the same thing only is a more convenient accessory than is white paper, so by all means use it!

And now a handy incident metering trick: When you are metering with the white incident dome attached to your meter, look at the dome, you will see a reflection on its surface from the source you are pointing it at. If you are using multiple sources such as main, fill, separation, and hair light, look for reflections on the dome from these lights to see which are contributing to the exposure. I typically like to read my sources separately to see what each light’s value is, then I know exactly what the ratio between my lights are. A hair light for instance, can influence the reading of my main-light (see Image [6]), looking at the dome guides my hand to the best position to block that separation light from the dome and from my reading (see Image [7]). Many lighting experts use flat incident disks for this purpose, however, I find flat disks are very angle sensitive and so require more care than I want to give during the heat of the battle. Many ask me, “Well, doesn’t your hand reflect some light back onto the dome as well thus influencing the reading?” to which I answer, “Yes, but not enough to matter.”

Sometimes this glare is hard to see on the gray textured surface; the texture creates multiple angles. These angles break up the glare, muting it into the card's true tone, raising the overall brightness - the point of a mid-gray tone is to place it, not a mid-gray tone with glare, at the mid-point of the gray-scale. The solution is to view the card from the camera angle and then rotate the card to remove the glare. How much you rotate the card away from the glare angle will affect the card's brightness too. Alas, photography is fraught with danger! The optimum angle is half-way between the light-source and the camera lens.

There is an easier way of setting mid-gray. Instead of a reflective light readings (which measures the amount of light radiating out of, or bouncing off a subject) we use a middle gray card, and take incident readings of the light striking the subject. To take these incident readings we need an incident meter. An incident meter is really just a modified reflective meter (see side-bar). Keep in mind that a light meter has a fraction of the brainpower of a worm; it has no idea what it is reading. All a meter does is measure the amount of electromagnetic radiation (light energy) striking its light-sensitive chip. Whether that energy comes from light bouncing off a gray card, a white wall, a scenic, or light coming directly out of a source like the sun, a light bulb, or a strobe-head (flash) it does not know, nor does it care. It would just as soon be snuggled up inside its soft felt-lined case, thinking about batteries, rather than pondering where the light striking it comes from.

It is important to remember, when taking an incident meter reading, that you don't point the meter at the subject. Instead you place the meter close to the subject plane and then point the white dome away from the subject to read the light that is striking. A reflective meter reads how much light is reflecting from a surface whereas an incident meter reads how much light is striking that surface. In addition to these essential tidbits of information, a reflective meter not an incident meter should be used to read directly off objects that give off light, such as a computer screen, an LED readout, hot steel, molten lava, a light-source such as a lamp that is to appear in your image. The reading displayed on your meter's readout is a setting to make that glowing source photograph as mid-gray, it is up to you what to set your camera at to make that glowing source look right; there is no correct exposure for such things. For instance, a glowing white window of an application on a computer screen might read f8 at 1/4 a second. This will render that white area as middle gray, but if you want that gray to look like a glowing white, then it is necessary to create a brighter exposure relative to this setting. In this example I would suggest setting exposure to somewhere between f8 at 1 to 2 seconds, now this screen window will be glowing white in the image.

By now you are probably just as sick of hearing the term middle grey as I am writing it. However, to a meter, middle grey is everything, that is its world, middle grey is all it knows or cares about (other than perhaps batteries). A meter can only be used for two things:

1. Find an exposure to make a mid-grey card photograph as middle grey whether that card exists in the final image or in the case of an incident meter reading, ever existed at all.
2. Make something that is not middle gray appear middle gray.

Be aware that either one of these readings will not tell you the actual brightness value of a given subject, for that we need to take an exposure reading (a reflective meter reading off a grey-card or an incident reading of the light striking) then take a subject brightness reading (a reflective meter reading directly off the subject in question), and then compare the second reading to the first. How much brighter or darker the subject brightness reading is relative to the exposure reading is the real life subject brightness. For instance, a reflective meter reading off a grey-card or an incident reading of the light striking Tony (see Image [1]) gave me an exposure reading of f8. A reflective reading off Tony's flesh in an area that was fully lit and glare-free reads f5.6. F5.6 is one stop darker or half the brightness of f8, therefore according to my meter Tony is half as bright as a grey-card (in real life he actually seemed quite intelligent). So on the gray-scale, Tony's flesh is a minus one value or a Zone 4.

The most advanced form of metering is spot metering. This allows you to selectively meter parts of a scene or subject with reflective readings. Exposure and contrast decisions from these readings rely on your ability to accurately recognize real-life tones and expose them accordingly for a correct exposure or expose them incorrectly for subjective reasons. To develop this skill you need to practice identifying tones. To do this look at the tone in question, ask yourself is it brighter, darker, or the same as middle grey? Then to check your accuracy, do the "two-reading two-step" described above. In a very short time you will become a tone recognition expert and the life of any party you attend as you show off your new highly developed skill.

Next time we will dig even deeper into metering for "Lighting with Digital".

Dave Montizambert lectures internationally on lighting, digital photography, and Adobe Photoshop. He is also a published author having written two books on lighting and digital photography (www.montizambert.com) plus numerous magazine articles on these topics in North America, Europe, Russia and Asia. Dave also creates Photoshop tutorial CDs & DVDs for www.software-cinema.com.

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Dave Montizambert owns and operates Montizambert Photography Inc. located in downtown Vancouver. For the past 25 years his company has created photographic images to aid various organisations and companies with their communication needs. He has created images for clients such as: McDonalds Foods, Motorola, Atlanta Scientific/Nexus Engineering, Toyo Tires, Tri-Star Pictures, Warner Brothers, Constantine Films of Germany, Chevron Canada, Cuervo Tequila, the Canadian Broadcasting Corporation, J&B Scotch, Hong Kong Bank, Chimera Softboxes, B.C. Lottery Corp., Blackcomb & Whistler Mountains, Tsing Tao Brewery of China, B.C. Hot House, Kona Bikes, No Fear Sports Gear, Kodak, and Canada Post.

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