Photography is all about light. When considering lighting for photography, there are two different philosophies – do you record existing light, or do you physically create and/or manipulate it before it strikes the subject? A large percentage of photographers are all about capturing existing light, with only a small percentage into creating with light – which makes sense, it takes far more equipment, knowledge, effort and time to create lighting. Those who create with light also record, but they are recording what they have created, not solely what was pre-existing. Recording existing light means you record it without manipulating it in any way before it strikes the scene/subject(s) – all control is after the light has struck. These controls are things such as exposure settings, focal length, filters, imaging format, Photoshop, and darkroom techniques (if using film) – all of these are two-dimensional controls because at this point you have entered into the photographic process and the photographic process flattens space and time into height and width. Whereas creating with light, is all about creating and controlling light before it strikes the scene/subject(s). These lighting controls put you in charge of quality, quantity and direction of the light striking your subject through controlling size and distance of light source(s), lighting ratios, and all done with the use of different types of lights (strobe/flash or constant light), lighting modifiers, movement of light-source and much more. Even though the camera will flatten your scene/subject(s) into two dimensions, these 'create with light' possibilities are all three dimensional controls since you perform them in a three dimensional space; I say three-dimensional but really you could say four-dimensional – consider painting with light. In fact, lighting is not really a photographic process at all – consider the myriad uses of lighting that are not for photography – though we may create it for the photographic process.

Ansel Adams is arguably one of the most famous photographers in history. His teachings based on 'The Zone System' were the basis of many photographic training institutes where their teachings were heavy on darkroom, the Zone System, and not much on lighting – or at least so was the case in North America. Lighting was taught mostly as a bunch of recipes with little to no real lighting theory to back it up. It is interesting to note that Ansel Adams' Zone System, as revered as it is, was really a system for capturing existing lighting and not really an effective system for creating lighting. His controls over lighting contrast occurred after light struck the scene/subject(s); nothing was done to affect the lighting contrast before the light struck. This makes perfect sense when you consider how impossible it is physically to create and control light on large subjects such as his scenics or my image of the wilderness scene with kayaker in Image 001. Now I'm not saying that he had no control over lighting before the light struck in his outdoor scenes, after all he could wait; wait for the right time of year; wait for the right time of day; wait for the right weather conditions. In other words, use nature to get the direction of light and the light quality (hard or soft) he desired. Where Adams exerted most of his control over lighting contrast was after light hit the subject. His arsenal of lighting contrast controls included: coloured filters, polarisers, exposure and his darkroom techniques. With Ansel Adams' system, he was able to affect global and local contrast after the fact. He did this by altering exposure and processing of his black and white (B&W) film for global control while relying mostly on his master-printer prowess with darkroom techniques such as dodging and burning for local lighting contrast. Ansel Adams' Zone System was a B&W system, it did not work with colour film since altering processing times to control contrast skews colour in an undesirable way.

When colour film first came out, photographers still tried to use Adams' exposure method which was, 'Expose for the shadows and process for the highlights,' but due to the skewed colour problem, could only process 'normal' and so had to change it to, 'Expose for the shadows and print for the highlights'. This was very limiting! In portraiture, in order to have some consistency, the photographic educators tried to standardise the process by creating a rule that the light striking the shadow side (shadow ratio) could only be one stop darker than the camera setting – no dramatic lighting here! The better solution – which ensures creative freedom and consistency from one frame to the next, from one shoot to the next, and which has for the most part won out – is to make the lighting contrast you want by creating and/or controlling the lighting before it strikes the subject. For instance, add a fill-light or reflector to attain the shadow fill ratio you desire. To record this range of contrast accurately you would use a reflective light meter, held in one hand, to read off a middle grey card held in the other hand. For this reading, the card is positioned against the subject and bathed in light from the main-light-source. The resulting reading is the exposure you set your camera to. Of course, almost nobody does this because incident light meters are a more elegant way to attain the same result – all you need do is place the incident meter with its back against the subject then point the white dome at the main-light-source so that it is bathed in light from that source, then take your reading, and all this done with just one hand!

To my mind, film processing is the cornerstone of Ansel Adams' Zone System; if you deviate from normal processing, that is leave your film in the processing chemicals for a longer or shorter period than normal processing requires, you will alter lighting contrast globally. Removing film from its chemical bath early – called 'Pull Processing' – will reduce contrast; increasing time in bath will increase contrast and is called 'Push Processing'. So why does process time affect lighting contrast?

Film is made up of natural gelatine taken from slaughtered cattle and horses. This gelatine is spread thinly over a substrate – originally this substrate was glass sheets and then later glass was replaced with a flexible transparent acetate material – either way these substrates created a surface for a film of gelatine to sit upon. Before the gelatine was applied to this film base, silver halide crystals were mixed into it; this gelatine and silver halide mixture was called the 'emulsion'. The molecular structure of these light-sensitive silver halide crystals are altered when struck by photons (light). Any of these crystals that are hit by light are altered once again when they are submerged in processing chemistry, the chemistry turns them into dark opaque crystals. The crystals that have not been exposed to light do not react to the chemistry and so do not turn opaque, they simply wash away, out of the emulsion, during processing. The dark opaque crystals left in the emulsion are what film grain is made up of and are the building blocks or 'pixels' of a film image.

You might think that a film emulsion is flat or two-dimensional, yet it is not! If you were to view a sheet of film from its side using powerful magnification, you would see that it has depth: a top surface, a middle section, and a bottom surface which sits directly on the acetate base. You would also notice that there are silver halide crystals at the top, all through the middle, and all over the bottom of this film of gelatine. When light strikes a film emulsion, it penetrates in varying degrees depending on the amount of light and the amount of exposure time. It takes more photons – either by time or volume, or both – to affect deeper silver halide crystals. For instance a bright area in a scene will send more photons through your lens onto the film than will a darker area – more photons equals deeper penetration into the emulsion reaching more silver halide crystals. A dark subject area only affects the surface crystals in the emulsion because there are not enough photons striking the film from that area to penetrate to any depth; whereas a bright subject area will send many photons to the film thereby affecting both surface and deeper crystals.

Once the film is dropped into the soup (processing chemicals), the chemistry starts to soak into the emulsion. Obviously the halide crystals at the surface are hit first and as time permits, the chemistry soaks deeper and deeper into the emulsion affecting crystals deeper and deeper within. If you shorten the development time, it makes little to no

difference to the surface crystals since their development is completed in the first moments of submersion in the soup. This means that the areas of the film representing the darker areas of the scene are processed in no time at all; whether you shorten or lengthen the processing time, little difference in film density occurs for these dark portions from the scene, either way they turn out much the same. This is not true for the areas of the film that represent the bright areas of the scene. If you shorten processing time then the chemistry has less time to soak into the emulsion and so will not reach the deeper crystals that have reacted with photons; this area of the film will be lower in density than it would have been if the standard processing time had been applied. So, to sum it up, Ansel Adams' system revolved around this fact: altering processing time has almost no effect on dark subject areas but it does have a profound effect on light subject areas; you place the darkest significant area of your scene with camera exposure and then control the brightness of the lightest significant area of your scene by manipulating processing time.

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By the way, if you forgot or were born recently, remember that lower density portions of a negative appear as darker areas on the print and higher density portions appear as brighter areas on the print – a totally clear area on a negative reproduces as black; a totally dense or opaque area on a negative reproduces as white; a light grey area reproduces as dark grey; a dark-grey area reproduces as light-grey; and a middle grey area reproduces as middle-grey.

To put the above concepts into practice you need a film camera, film and reflective light meter – preferably a handheld 1° spot meter. Start by framing/composing the subject, then meter the darkest significant area of that subject – 'darkest significant' means the darkest area in which you want to maintain some detail in. Looking back at Image 001 I chose the dark rudder of the kayak. The resulting reflective reading displayed on your meter does not tell you what this tone is, but it does tell you what exposure to set your camera at in order to make that tone photograph as a middle-grey. Once you know what this setting is, you can deviate from it to make that tone any brightness you want; keep in mind that all the brightnesses of all the other tones of your image will be altered too as they fall into place relative to this setting. With that in mind, set the exposure you want for this dark tone on your camera then return to your light meter and take a second reflective reading off the brightest significant tone in your scene; looking once again at Image 001 I read off the bright white patch of direct sunlight hitting the white top of the kayak directly in front of the subject. This reading indicates what exposure setting is necessary to make this bright tone photograph as middle-grey. Since the camera exposure is set to a setting that places the darkest significant tone where you want it, you need to compare the bright-tone reading to what the camera is set to. The difference between what the camera is set to and what this bright area reads, is exactly what this tone will reproduce as if you process the film with normal processing. You could instead decide to pull this bright tone down closer to the value of the darker tones with pull processing. Or conversely, you could push those brighter tones further away from the darker tones by increasing processing time – push processing. Essentially you are contracting or compressing the tonal range in the first instance and expanding or stretching the range in the second. To put it another way, you are effectively decreasing lighting contrast globally in the first and increasing lighting contrast globally in the second. This image (Image 001) was shot late in the year in the interior of British Columbia on Clearwater Lake in Wells Gray Park back in 1990. That time of year air temperatures are dropping and so a lot of mist occurs over the lake. This magical mist coming off the lake created rather flat lighting contrast despite the back-lit spot-lit circle of light surrounding the kayaker emitted from the sun through a small hole in the overcast sky. To increase contrast globally, I over-processed the film by 1 stop; this pushed the brighter tones further up the grey scale away from the darker tones, yet even this was not enough. Unfortunately for me, modern films (late 1900s and onwards) have thinner emulsions than earlier films and so most are difficult to push process by more than one stop. Not letting such a shortfall pull me down, I increased contrast further by printing (darkroom not ink-jet) the image on high-contrast paper.

I use 'darkest significant point' and 'brightest significant point' instead of 'Shadow' and 'Highlight' because I find the latter terms ambiguous; they do not differentiate between an object that appears dark because it is in shadow and a dark toned object that is fully lit. These differences matter when you are contemplating how to light your subject when you are physically creating the light not just cashing in on the Almighty's handiwork!

There is much more to Ansel Adams' Zone System, such as setting up or zeroing-in your system – calibrating/testing your camera, meter, and processing to one another. If you wish to learn this (if you are a glutton for further punishment) look to Ansel Adams' books, 'The Camera,' 'The Negative' and 'The Print' – my article is just an overview of how the system works for someone who is interested but not really going to do it, sort of a lazy-person's armchair guide to Ansel Adams' Zone System. I wrote this article because I think it is important to know the history of your craft, at least a little, since it is an important part of having a solid knowledge foundation that helps you to create and problem solve. Case in point, the zone system that I use to meter and set lighting ratios when creating my lighting, is based on all the same metering principles Adams taught in the Ansel Adams' Zone System.

Having had a look back at Ansel Adams' Zone System, it has made me even more thankful for our modern-day post-production applications such a Lightroom and Photoshop where the control over lighting contrast is incredible and is not a blind, one-way process – you can see what you are doing as you do it and you can undo and redo as many times as you like – plus you can do it in colour just as well as in B&W!

Bio
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 lighting and Photoshop tutorial DVDs for www.software-cinema.com & www.PhotoshopCAFE.com/video and authors 'Dave On Demand' (www.montizambert.com) lighting tutorial based photo-training. Dave is available for lectures and workshops in your area and can be reached through www.montizambert.com.

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