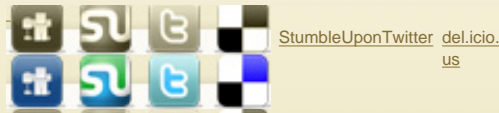


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Photography 101.4 - Exposure and Stops

by [Neil Creek](#)



The following post is from Australian photographer [Neil Creek](#) who is part of the [Fine Art Photoblog](#), and is developing [his blog](#) as a resource for the passionate photographer.



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Welcome to the fourth lesson in **Photography 101 - A Basic Course on the Camera**. In this series, we cover all the basics of camera design and use. We talk about the 'exposure triangle': shutter speed, aperture and ISO. We talk about focus, depth of field and sharpness, as well as how lenses work, what focal lengths mean and how they put light on the sensor. We also look at the camera itself, how it works, what all the options mean and how they affect your photos.

This week's lesson is **Exposure and Stops**

So far we have covered the basics of turning light into an image, starting with the concept of the pinhole camera, then introducing lenses and how

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they focus light, and last time about how the qualities of the lens affect the size and brightness of the projected image. So far this has all been pretty theoretical, but it's important groundwork to helping you *internalise* how the camera works. When you know these basics, you can get to the solutions of photographic problems that much faster.

This lesson we're finally going to start getting a bit more practical. You will learn about the brightness of light, and how it is controlled. Of all the fundamentals of photography, this is probably the most important to understand, and can be the most intimidating because of the terminology used. But fear not! The mysteries of exposure and stops are about to be revealed!



Some Housekeeping

Lesson naming

I've updated the naming scheme for this series to include the lesson number as a "point" value after 101. This will help you keep track of where you are up to in the series.

What happened to aperture?

Last time I said that this lesson would cover aperture and stops. I think introducing exposure and stops as a concept is important enough to dedicate a whole lesson to. Aperture will be now be discussed in Lesson 5.

What is "exposure".

In the simplest terms, exposure is: *"is the total amount of light allowed to fall on the photographic medium during the process of taking a photograph"* (Wikipedia).

Whether it is a digital sensor chip or grains of chemically dosed silver on a film, it is the same thing. The greater the amount of light that falls onto a particular region of the photographic medium, the brighter that part of the recorded image will be when reproduced, whether on screen, print or slide.

The variation of brightness in the real world is absolutely huge, much more than you might think from your subjective experience of it. A subject lit by the midday sun on a beach looks over **four thousand times brighter** to your camera than the same subject lit by the quarter moon! (fredparker.com)



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Introduction

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Brightness is measured in "Exposure Value" or EV.

You might recognize this acronym from your camera's settings or manual. An EV of 0 is defined as an image exposed for 1 second at f1. Steps of one up or down from zero are a change in the light by a factor of two. So an EV of 1 is twice as bright, EV 3 is eight times as bright, and EV -2 is one quarter as bright.

The "Stop"



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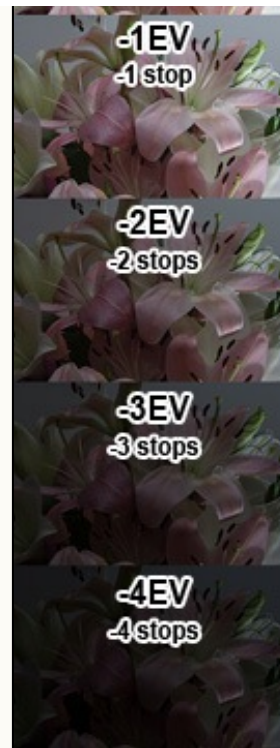
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Fig

1.4.1: From a base exposure, the exposure is increased and decreased in one stop steps to +/- 4 stops.

A step up (doubling) or down (halving) by one EV is called a “stop”.

If you only come away from this lesson having learned one thing, it is this. Photographers talk about light and exposure settings in terms of stops. In photography a stop can refer to different settings in any of the three points of the exposure triangle ([more below](#)). One of the most important and useful things you can learn as a photographer is to get an intuitive feel for light levels.

I'm not suggesting that you should be able to walk onto a location and immediately be able to assess the EV of the light and determine the correct exposure settings (although some very experienced photographers can do just that!) - that's what your exposure meter is for. However, if you can learn to look at a photo you have taken on the back of your camera, and see that the exposure needs to be increased by say 2/3 of a stop, then you will become a much more efficient and successful photographer.

Controlling Exposure

To accommodate the huge variety of brightness levels we see in the real world, we need to be able to control how much light gets to the camera's sensor. We do this by adjusting one or more of the three points of the “exposure triangle”. **These three points are ISO, Shutter and Aperture.**

The aperture is an adjustable iris or opening that can be made wider to let in more light, or narrower to let in less. The shutter is the “gate” that allows light onto the sensor, and it can be left open for different lengths of time, to let the sensor collect more or less light. Finally, the ISO once referred to the sensitive to light of the film in the camera. In digital cameras it refers to the “gain”, or amplification of the information collected by the sensor. In film days, changing ISO meant changing films. Today the ISO can be easily adjusted with a dial.

[photography tips here at DPS.](#)

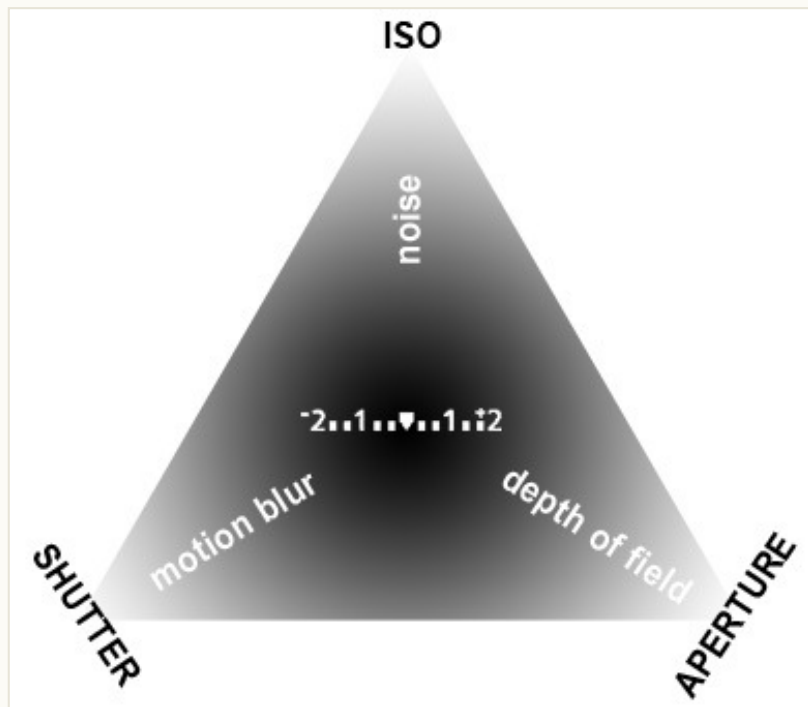


Fig 1.4.2: The exposure triangle.

Each of these points will be the subject of future lessons in Photography 101. For now, you need to know that they are there, and that they all work together to control the exposure. At the centre of the exposure triangle is your camera's light meter. It is by reading this that you determine how to set each of the three points. We'll cover that in a future lesson as well, probably in Photography 102 - A Basic Course in Taking Photos.

Trade-Offs

Each method of controlling exposure does so in a different way, and as such, has a different effect on the character of the resulting photo.

Increasing the shutter speed reduces the light, and freezes motion. Decreasing it allow more light in, but blurs movement occurring while the shutter is open. Closing the aperture decreases the light, but increases the depth of field, meaning sharp focus over more of the image. Opening the aperture lets in more light, but decreases the depth of field, meaning a narrower window of sharp focus. Increasing the ISO amplifies the light collected, but also amplifies the random noise in the chip, which can become visible in photos at higher settings.

It's important to note that all of these effects can be used for creative purposes in photography. Having a narrower depth of field for example can be an artistic effect in a portrait, a slower shutter speed can convey a feeling of movement. Taking a good photo is the result of the conscious choice of the three points on the exposure triangle in order to get a well exposed image which has a character pleasing to the photographer. Adjusting the settings is a balancing act that affords huge creative options to the photographer.

Homework

- Put your camera into manual mode, and find the controls to adjust each of the three exposure triangle points: ISO, Shutter and Aperture.
- Set your camera to full auto, find various scenes, and "half press" the shutter and see what exposure settings it recommends. Now go to manual, make the settings using the manual control and take the photo. Repeat until you feel comfortable adjusting the manual settings.
- Using the technique above, see what the camera recommends for various scenes, then adjust the photo up or down one stop of exposure with each of the exposure controls. Note the difference in the appearance of the resulting photos.
- For those already familiar with manual control, find difficult, high contrast scenes (eg: a wall with a window outside, or under a shady tree on a sunny day). Shoot the scene on auto, then looking at the result, try to guess how much you need to adjust the exposure manually to see detail in the over or under exposed areas. Practice to see how close you can get just by estimating.
- Apply these lessons artistically. Experiment with deliberately over or under exposing photos (high and low-key photos) or tweaking the auto exposed settings to emphasise otherwise under or over exposed areas.
- If you wish to share your homework photos, upload them somewhere (eg: your Flickr account) and post a link to them in the comments on this post below.

Resources

- [Exposure \(photography\)](#) - Wikipedia
- [The Ultimate Exposure Computer](#) - fredparker.com
- [Master the Manual Mode](#) - PhotoAficianado.com
- [Bright Ideas For Shooting In Midday Sun](#) - DPS
- BOOK - [Understanding Exposure](#) - Bryan Peterson
- BOOK - [Nature Photography Field Guide](#) - John Shaw

Next Lesson

Photography 101.5 - Aperture

An overview of the first point on the triangle: aperture, including creative applications.

Any Questions?

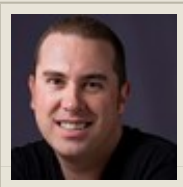
I want to help my students learn, so I am always happy to answer any questions you may have. I'd also love to make friends with you, and perhaps talk about better ways to teach what I know, and learn more myself. So far I have been answering questions posted in the comments on each lesson. This time I'd like to experiment with **using Twitter** to take your questions and suggestions. So if you'd like to **tweet me**, then please feel free to add me to your twitter 'following' list:

Follow me on Twitter, username: [neilcreek](#)

I also strongly encourage you to participate in some **extra curricular activities** to develop your photography skills, and the monthly [photography projects](#) I run at [my blog](#) are ideal for this! While you're there, please feel free to check out some of my other photography posts, and if you like it, [please subscribe to my feed!](#) I also am part of the [Fine Art PhotoBlog](#), where I sell [my photography](#) as high quality fine art prints along with [six incredibly talented photographers](#).

See you next lesson and good luck with your homework!

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Neil Creek is a professional photographer from Melbourne, Australia. He has been shooting with a DSLR since 2004, and blogging about his experiences since 2006. The focus of his writing today is about the journey he is taking from amateur to professional. View Neil's folio at [his home page](#). Read his photography writing [at his blog](#). Connect with him [on Twitter](#).



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