

Mastering Your Camera

The Ultimate No-Jargon Guide to Using Any DSLR



by Michael Willems

First Edition

EXCERPT

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Colourful Jogger: a DSLR photo

Foreword:

As an engineer, a photographer, and an educator, I have always wondered why the three worlds of *technology*, *photography* and *learning* have to be so far apart. And of course they don't need to be. The problem with cameras is not that they are unnecessarily complex; the issue is more the inability of the designers to make the interfaces simple, and of educators to explain. This book brings the three worlds together for you, so that you can quickly start doing what it's all about: making great pictures with your great SLR camera.



This book is intended for beginners and intermediate users, but advanced users will also find it very helpful, in that it fills any gaps you will have, and it has lots of advanced tips and tricks (and photos you might find inspiring). Enjoy!

Michael Willems



Gamla Stan (Old Stockholm, Sweden)

ABOUT THIS EXCERPT

This Book Excerpt contains the following sections from the full book:

1. Foreword
2. Table of Contents (do read this to see what else the full book covers!)
- 3. The full Chapter 4: “Mastering Exposure”**
4. Afterword
5. About The Author

Do, however, realize that this is taken out of context. Although Chapter four is a stand-alone chapter useful in its own right, you miss the introduction, the exercises, many more examples, and the logic behind the teaching method. So if you do not understand something here, blame it on that. I really do recommend that you take the full book and read it from beginning to end, even if you already know a lot about the basics.

Please do not think this is all the book contains about exposure—see the “Advanced Exposure” chapter listing in the Table of Contents. But I think as an introduction both to the book’s full contents and to its style, you will find it useful. Plus—you really do need to know what aperture and shutter are and do.

As a final note the graphics in the full book are of higher quality than those in this preview.

After reading this: the full book is available from www.michaelwillems.ca

Las Vegas, January 2014

Michael Willems

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Chapter Four

Mastering Exposure

EXPOSURE



Now, before we get to the remaining exposure modes (Aperture Priority Mode, Shutter Priority Mode, and especially Manual Mode), you need to first understand basic exposure. And when I say “basic”, I do not mean that it is simple: I mean that it is at the basis of everything.

“Exposure” basically means “exposure to light”, i.e. “how much light do we let in, and how bright does that make the picture”. Three things, and only three, determine that exposure: *Shutter Speed*, *Aperture* and *ISO*. In the next section we will get to know how to use them: for now, let’s start with what they actually *do*.

The Shutter

The shutter is the little “door” in your camera that closes off the sensor (or in the past, the film) from light. When you click, after the mirror flips up, that shutter opens for a short time, and then it closes again. We call that “the shutter speed”: a faster shutter speed means the shutter is open for a shorter time.

The longer the shutter opens for, the more light comes in: in that sense, making a photo is like painting with a can of spray paint. The longer you spray, the more paint. The longer you keep the shutter open, the more light. (The analogy is a very good one: light is a stream of photons, “little light particles”, and your sensor is a photon detector. The more photons, the more light it detects).

Shutter speeds are expressed as fractions of seconds. In the following table each successive step is twice as fast, i.e. takes half the time, and hence gives you half the light (we call that “one stop less light”):

<--- MORE light LESS light --->

very slow	very slow	very slow	slow	slow	med	med	med	fast	fast	fast
1 sec	1/2 sec	1/4 sec	1/8 sec	1/15th	1/30th	1/60th	1/125	1/250	1/500	1/1000 sec

So the shutter is one way to regulate the amount of light entering your camera. That is the “technical” effect of the shutter. Longer shutter makes the picture lighter; shorter shutter, darker.

There is also a creative effect of the shutter: namely, the shutter speed determines what happens with motion. In the following ways: fast shutter speeds freeze motion, while slow shutter speeds blur motion.



The image on the left used a fast shutter speed of 1/500th second; the picture on the right used a slow shutter speed, like 1/2 second. Can you see the difference?

The Aperture

The second mechanism in your camera is not in fact in your camera: it is in your lens. A series of blades, a diaphragm, that can move to create a larger or smaller circular opening. We call it the Aperture, which means “opening”. Your lens may be a certain size, but when you actually press down and click, the opening usually gets smaller. That’s the Aperture.

The aperture is expressed as an “f/number”. That f-number is a *fraction*; a larger number thus means a smaller opening size. Just like 1/16th pizza is in fact less than 1/5th pizza, even though the number “16” is greater than the number “5”.¹

¹ So, strictly speaking, it is not “f 8”, but it is “f divided by 8”.

MORE light <-----

---> LESS light

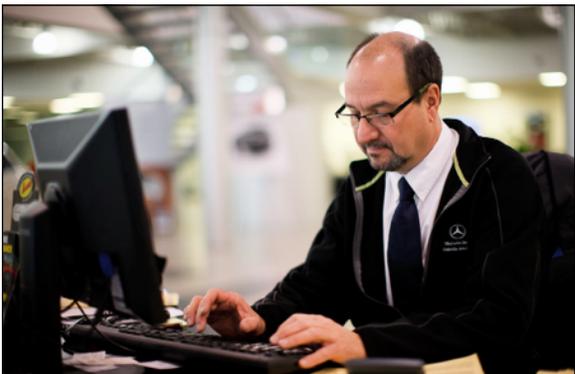
large	large	large	med	med	med	small	small	small
f/1.4	f/2.0	f/2.8	f/4	f/5.6	f/8	f/11	f/16	f/22

So the aperture also provides a way to regulate the amount of light entering your camera. That is the “technical” effect of the aperture.

There is also a creative effect of the aperture: it determines your photo’s depth of field (“DOF”), or “how much of the picture is sharp”. A larger aperture (a small “f-number”) means a narrower depth of field; a smaller aperture (a larger f-number) means extended depth of field.



For example, the picture on the left was taken with a setting of f/1.2; the picture on the right was taken at a setting of f/11:



ISO sensitivity, again

We discussed ISO in the previous section. Previously, in the film-days, known as ASA, this variable indicates how sensitive your camera is to light. The more sensitive (the higher the number), the less light it needs. In the past, the film you put in your camera decided the ASA. Today you can adjust it on the camera, separately for each image if you like. The camera increases the amplification of the light signal if you set the ISO to a higher value.

A higher ISO number can be convenient: with a high ISO you can shoot pretty much in the dark; or in any given situation, increasing the ISO means that you do not need to open the aperture so much, or you do not need such a slow shutter speed. So higher ISO can be good.

Why not, in that case, set our cameras permanently to a very high ISO?

As so often in life, there are no free lunches. There is a price to pay. In the case of high ISO values, that is electronic “noise”, or “grain”, which leads to a decrease in image quality. When you amplify a signal, you also amplify the noise. That is why you do not increase ISO to the highest settings every time; rather, *you go as high as you must, but keep as low as you can.*

The two side-by-side photos below show a small detail of a photo: one shot at 100 ISO, one at 3200 ISO. Can you tell which is which?



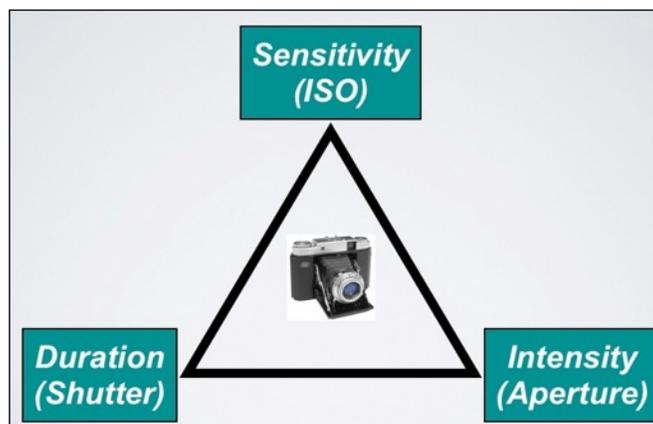
Here is my suggestion for some good ISO starting points:

Setting	Starting Point
Outdoors, handheld in daytime	200 ISO
Indoors (even when using flash)	400 ISO
Difficult light/Sports	800 ISO
Very difficult light/Indoors Sports	1600 ISO

In general, start low, but *do not be afraid to go higher if you need to*. Modern cameras can make great images at high ISO values, and even if you do get some grain: a grainy picture is almost always better than a motion-blurred picture. I shoot at 12,800 ISO sometimes, when I really have to.

Putting The Triangle Together

So now you know the three elements that make up exposure. These three - Shutter, Aperture and ISO - are the only three:



As a photographer you need to know how they work together. Which, once you understand the sections above, is really very simple, at least conceptually (and ***the following diagram should be one of your mantras: you should eat, sleep and breathe this***).

CONTROLLING EXPOSURE			
	F-number	Shutter Speed	ISO
For a brighter picture	LOWER	SLOWER	HIGHER
For a darker picture	HIGHER	FASTER	LOWER

It really is as simple as that.

Sure, there are practical limits for each variable², but the principle never ceases: there are precisely three ways to make a given picture brighter, and three opposite ways to make it darker.³ No more, no less.

² What are these practical limits? See if you can come up with them by yourself.

³ “But what about exposure compensation”, I hear you ask, the “plus-minus button”? Well, actually, that just changes one or more of the variables above!

Equivalent Exposures

Think about that table. It shows that there are three variables that all determine how bright a picture is. So the same brightness could be obtained in many ways. That is why there isn't "one correct exposure".

Remember these two photos?



1/500th sec at f/1.4



1/2 second at f/22

Clearly, those pictures are equally bright; but equally clearly, the shutter speed was different. So something else must have changed too, and it did: the aperture, as per the following table.

Shutter Speed (second)	Aperture (f)
1/500th	f/1.4
1/250th	f/2
1/125th	f/2.8
1/60th	f/4
1/30th	f/5.6
1/15th	f/8
1/8th	f/11
1/4	f/16
1/2	f/22

Example Equivalent Exposures

As we go down the table:

- Each next shutter speed step *doubles* the light;⁴
- Each next aperture step *halves* the light.

And of course those cancel each other out. The resulting picture's brightness is equal for all combinations here.

Of course when we add ISO to the mix, there's even more possible combinations that all give you the same brightness: around one gazillion.

As for “a stop each time” as we go up or down the table: is that a coincidence? No, the shutter speeds and “main aperture numbers” were chosen that way, of course. Hence those funny aperture numbers.⁵

⁴ We call doubling or halving the light “one stop”.

⁵ For math and physics geeks like me: the ratio between aperture numbers is $\sqrt{2}$, the square root of 2 (=1.414...). Why? Because the half the light means half the area of the aperture circle; and the area of a circle is πr^2 , so half the area means reducing the radius by $\sqrt{2}$.

MANUAL EXPOSURE MODE BASICS

We will start with what many people falsely assume is the most difficult mode: Manual Mode. This mode, where you have to set all three variables (ISO, Aperture and Shutter) yourself, is in fact the easiest mode—certainly the easiest to understand, and the easiest mode if you want to learn the exposure triangle we discussed in the previous section.



Why is this mode easiest, if you have to do all the work yourself? Let me explain. First, *you* are in charge, so *your* requirements will be met. Second: every change that is made to the camera is made by you and only by you. In other modes, on the other hand, the camera and you both make adjustments, and it can be difficult to see exactly what is happening.

Why? Think back to the exposure table in the previous section:

CONTROLLING EXPOSURE			
	F-number	Shutter Speed	ISO
For a brighter picture	LOWER	SLOWER	HIGHER
For a darker picture	HIGHER	FASTER	LOWER

Say you are in Program mode, and you turn up the ISO. Will the picture get brighter, as you might reasonably expect? No, because as soon as the camera sees that you have increased the ISO, it thinks “oops, the picture will get

too bright now”, and it now immediately either increases the f-number, or the shutter speed, or both, to neutralize your change. This way, you’ll never learn! In manual mode, on the other hand, nothing changes unless you change it.

A third advantage of Manual Mode: once you have set up the camera properly for a certain light situation, every subsequent picture will be correct, too, unless the light changes.

That is why we start in Manual Mode. You will find that “real” photographers spend more and more time in Manual Mode as they learn; but at least, start in this mode. You are responsible for setting all three of the essential exposure variables, ISO, aperture and shutter. (This also means that you can get it wrong, of course. You need to know how to do things. Read on.)

Start by setting your camera’s mode dial to “M”, and let’s see how you operate the camera in this mode. This is real photography!

Setting the ISO Sensitivity

This is done the usual way: either there is a button, in which case you hold it down while using one of the control wheels to make an adjustment; or the ISO setting is in the “Quick Menu”, or it is in the full “Menu” menu. Try it now: set the value to 800 ISO.

(Nikon users: Ensure at this time that the “Auto ISO” feature is not enabled. Else, manual is still not manual! This setting is done in one of your camera’s menus. On Canon cameras, on the other hand, the “auto” setting is part of the same menu where you set the actual value, so there can be no confusion.)

Setting the Shutter Speed

This is usually done by first waking up the camera with a light touch on the shutter button, then adjusting the shutter by turning a control wheel: usually, the main control wheel (the one at the top, if your camera has two control wheels; the only wheel, if there is just one).

Try it now: set it to, say, 1/60th second. Make sure you check the display at the back, or the LCD display on the top, or in the viewfinder.⁶

Setting the Aperture

As before, you start by waking up the camera with a light touch on the shutter button. Now, setting the aperture is done either by turning the secondary control wheel, if your camera has two; or else by pressing a button in *combination* with the sole control wheel; that button either has a diaphragm symbol on it, or the letters “Av” (for “Aperture Value”).



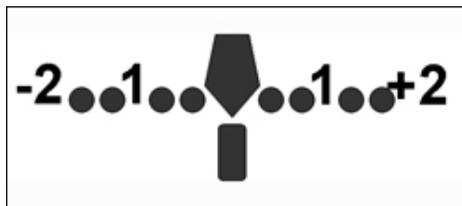
Try it now: set your camera's aperture to, say, f/5.6. Make sure you check the display at the back, or the LCD display on the top, or in the viewfinder, to verify that you have set it correctly.

⁶ It is wise to increasingly learn to set variables while looking through the viewfinder. Looking away at your camera will cause you to miss many photo opportunities.

MANUAL EXPOSURE MODE IN PRACTICE

So when we have to set all three variables (ISO, aperture and shutter speed) ourselves, how do we do this?

First of all: we have help: the built-in light meter in the camera's viewfinder. In manual mode, you use that light meter to guide your settings. All the camera does is display that meter for you. Look at it through the viewfinder, and you will see something like this⁷:



There is an indicator (a line in the example above, or often, a series of bars) that indicates where the exposure will end up with current settings. “0” means the image will be neither dark or light, a “normal exposure”; while “-” means the image will be darker; and “+” means it will be brighter.⁸

Note: “+” or “-” indications do not necessarily mean a wrong exposure.⁹ It means “hey, this image will be bright!” (plus) or “hey, this image will be dark!” (minus). Guess what? When you are shooting a snow hill “+” is exactly what you want, while for a night sky “-” is just what you should be aiming for.

I shoot in manual mode much of the time, but for convenience, you can often use the next few modes: Aperture Priority or Shutter Priority.

⁷ On a few cameras it is a numeric indication, like “-2”, or “+1”.

⁸ Careful: On Canon and similar Cameras, minus is on the left and plus is on the right; on Nikon cameras, minus is on the *right* and plus is on the *left*!

⁹ The meter is calibrated to give the right exposure when you set it to zero while aiming the camera at a grey card (an “18% grey card”).

Practical strategy 1: “Training Wheels”

You may well ask: “but with all these three variables, how do I even know where to start?”. A good question. One way to start, at least while learning, is by cheating, if you will—but it’s OK, you can tell everyone it was my idea and I allow it. And you do this as follows:

1. Choose program mode, or the mode that corresponds with the picture you would like to take (landscape mode for a landscape, etc).
2. Wake up the camera and look at the subject, and without even taking a picture, note down the aperture, shutter speed, and ISO the camera chooses in this case.
3. Now switch the dial to Manual Mode
4. Now manually set the ISO, shutter speed and aperture that you just noted down.

If you now look through the viewfinder, you will see the meter indicate a value not too far from zero. You can now fine-tune this using the table—the one you have by now just about memorized, I hope:

CONTROLLING EXPOSURE			
	F-number	Shutter Speed	ISO
For a brighter picture	LOWER	SLOWER	HIGHER
For a darker picture	HIGHER	FASTER	LOWER

EXERCISE: Go ahead, try this now. Get the indicator to “zero” and shoot.

Practical strategy 2: Aperture-led

You can also get to appropriate values in another way, a slightly more intelligent way if you will. Use this way if you are primarily interested in aperture (e.g. when depth of field is most important to you, such as when shooting a portrait).



A Photo Taken with Aperture set to $f/2.8$

1. Set your ISO to a value likely to be OK for the environment you are shooting in (see ISO section). Say, 400 or 800 ISO.
2. Now set your aperture to what you are likely to want. A low number (like $f/4$, or even $f/2.8$ or lower if your lens allows that) for blurry backgrounds; a higher number (like perhaps $f/11$) for “sharp throughout”.

3. Now adjust the shutter speed until the meter indicates an appropriate value (say “0” for an average picture, “-1” for a picture that should be dark; “+1 for a picture that should be light”).
4. Take a test shot. Look at that shot.
5. Now fine-tune/adjust the values according to need—using the same, all-important table as your guideline.

You will, of course, run into limitations. Selecting a low f-number outdoors might require a shutter speed faster than you can do, or selecting a high f-number indoors may well give you motion-blurred pictures. This “dealing with limits” is what becoming a practised photographer is all about.

Notice I said “practiced”: go try this now.

Practical strategy 3: Shutter-led

You can also get to appropriate values in another way, a slightly more intelligent way if you will. Use this way if you are primarily interested in shutter speed (e.g. when freezing or showing motion is important to you, such as when shooting sports or a waterfall).



A photo taken with shutter speed set to 1/500th sec

1. Set your ISO to a value likely to be OK for the environment you are shooting in (see ISO section). Say, 400 or 800 ISO.
2. Now set your shutter speed to what you are likely to want. A very slow speed like one second (1") for blurred fountains; slow like 1/15th second for slightly blurred photos; 1/125th for "no motion wanted" pictures;

1/250th to freeze relatively rapid movement, 1/1000th sec to freeze very fast movement.

3. Now adjust the aperture until the meter indicates an appropriate value (say “0” for an average picture, “-1” for a picture that should be dark; “+1 for a picture that should be light”).
4. Take a test shot. Look at that shot.
5. Now fine-tune/adjust the values according to need—using the same, all-important table as your guideline.

You will, of course, run into limitations. Selecting a slow shutter speed outdoors might require an f-number higher than your lens can do, or selecting a fast shutter speed indoors may well need an f-number lower than your lens can provide. This “dealing with limits” is what becoming a practised photographer is all about.

Notice I said “practiced”: go try this now.

A Rule Of Thumb: Sunny Sixteen

The “Sunny Sixteen” rule is a rule of thumb that says:

If your shutter speed is set to 1/ISO (e.g. 125 ISO at 1/125th sec, or 400 ISO at 1/400th sec, etc), then on a fully sunny day at noon, f/16 will give you the right exposure.

Like this, at 1/200th second at 200 ISO at f/16:



This rule is a rule of thumb, so feel free to vary – I often expose two-thirds of a stop higher—but since the sun is always the same brightness, it holds well. And it is nice to be able to expose without light meters, if only in order to be able to check your camera.

And if it is not sunny?

Then use values as in the following table.

The Sunny Sixteen Rule:

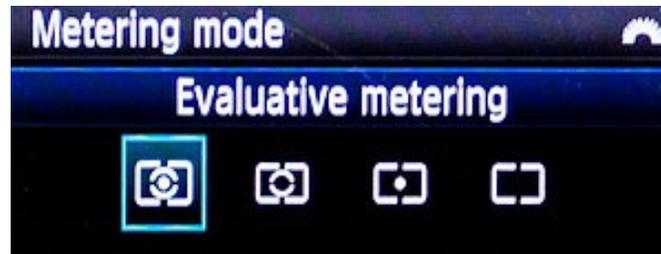
Aperture	Light	Shadows
f/16	Sunny	Distinct
f/11	Slight Overcast	Soft around edges
f/8	Overcast	Barely visible
f/5.6	Heavy Overcast	No shadows
f/4	Open Shade/Sunset	No shadows

Bonus question: how do you expose the moon?

Answer: f/16. The moon at noon is as bright as the earth at noon—they are the same distance from the sun!

METERING MODES

You can set the light meter to measure in various distinct ways: these are called “metering modes”. You may have seen symbols somewhat like this on your camera or in its menus:



The metering mode determines how exactly the camera calculates what exposure would be best for the picture you are about to take. In other words, the chosen metering mode will affect the exposure value displayed by the light meter (or the chosen exposure, in automatic modes).

There are around five possible modes of metering, though no camera I know supports all five:

1. **“Smart” metering.** This metering mode, which Canon calls “evaluative metering” and Nikon calls “3D Color Matrix metering”, tries to “intelligently” interpret the image. Rather than simply calculating an average exposure setting for the entire photo area it divides the photo into many little squares, and then applies an algorithm¹⁰ that calculates the exposure value that would correctly expose as many of these squares as possible. On top of that, it tries to “interpret” the picture: for instance, a bright strip at the top is interpreted as probably being sky and hence less important than what is below. Furthermore, the

¹⁰ This simply means “a method”, or “a formula”

method also takes into account such things as autofocus point, distance to subject, areas in focus or out of focus, colours of the scene, and backlighting. I usually leave my camera on this mode.

2. **Average metering.** In terms of “intelligence”, this is the opposite of the previous mode: the camera simply completely averages the entire picture and bases its recommendation on that.
3. **Centre-weighted metering.** This is like the previous mode, except that more priority is given to what is roughly in the centre.
4. **Partial metering.** This is just like the previous mode, except the camera only looks at roughly the centre 10% of the screen, and completely ignores the rest.
5. **Spot metering.** This, again, is like the previous mode, except the camera look at only about 1-3% of the screen.

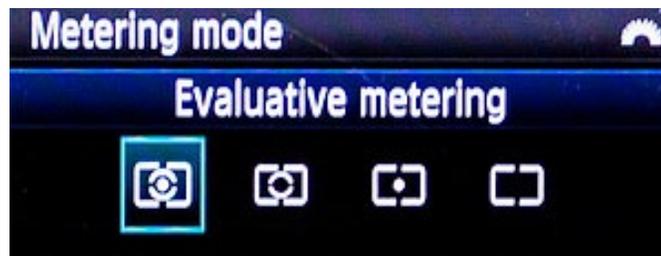
To set the metering mode, find the “metering” symbol, which looks somewhat like this (with “smart” metering indicated, on Canon, Nikon, Sony, Olympus, and Pentax):



Depending on the camera, this symbol can be seen on a switch (high-end Nikon cameras), or on a pushbutton (many Canon cameras), or in the “info-menu” (simpler Nikon cameras), or in the Quick Menu, as well as in the full menu (on most cameras, in addition to the previous possibilities).

Choosing a metering method

Find the control you need to set the metering mode, and set it to the mode you want. In this example, you see, respectively, the symbols for evaluative/centre weighted/spot/average metering:



You might find spot metering useful when the background is much lighter or much darker than your subject, like in this picture. Spot metering on the model would be a way to get the right exposure, since spot metering ensures that the rest of the picture is not taken into account:



Without spot metering, the camera would try to make the entire picture brighter (or in manual mode, the meter reading would trick *you* into making the entire picture brighter). The background would be “normally lit” now,

and the girl would be overexposed. Or here, the opposite would happen: without spot metering, the entire photo would be underexposed.



When using the spot meter, most cameras only look at the centre spot, so you need to aim that at the subject when metering. Some cameras, mainly advanced models, allow you to spot meter off your chosen focus point. In that case, no need to point the centre at the subject.

You might find centre-weighted metering useful when the you have a subject surrounded by a brighter area, such as when you shoot a portrait of a person against a window. The exposure will be mainly based on the centre, but unlike with spot metering, here it is not as crucial to aim the centre accurately at a “grey” (neither dark or light) area on the subject. Some people find this metering mode useful when using flash, also.

APERTURE-PRIORITY MODE

In this exposure mode, marked by “**A**” (Nikon) or “**Av**” (Canon) on the dial, you set the aperture (and ISO, unless you use “auto ISO”, which you should not), and the camera takes care of selecting the shutter speed that will give you a good exposure at that aperture. Aperture Priority is the most common exposure mode used by many photographers.



We call this a “semi-automatic mode”, since you do some of the work, and the camera does the rest. If you want a semiautomatic mode suitable for most situations, this is it.



But beware: automatic and semiautomatic modes just give you a “normal” exposure. If you need a darker or lighter exposure (such as when shooting a bright snow hill or a dark night sky) you need to use Exposure Compensation¹¹.

You use aperture priority mode when you need a quick photo, and when depth of field is your most important consideration (“do I want that background to be blurry or sharp?”).

¹¹ What does Exposure Compensation actually *do*? In Aperture Mode, you set the aperture, so exposure compensation makes the picture lighter or darker by changing the shutter speed. (And if you have auto ISO enabled, it can also change the ISO.)

SHUTTER-SPEED PRIORITY MODE

In this exposure mode, marked by “**S**” (Nikon) or “**Tv**” (Canon) on the dial, you set the shutter speed (and ISO, unless you use “auto ISO”, which you should not), and the camera takes care of selecting the aperture that will give you a good exposure at that shutter speed.



Again, we call this a “semi-automatic mode”, since you do some of the work, and the camera does the rest. Shutter-speed priority mode is sometimes used by photographers who shoot subjects that involve movement. Sports and animal photographers, for instance, may want to use this mode.



But beware: automatic and semiautomatic modes just give you a “normal” exposure. If you need a darker or lighter exposure (such as when shooting a bright snow hill or a dark night sky) you need to use Exposure Compensation.¹²

You use shutter priority mode when you need a quick photo, and when motion is your most important consideration (“do I want that moving subject to be blurry or sharp?”).

¹² What does Exposure Compensation actually *do*? In Shutter Priority Mode, you set the shutter speed, so exposure compensation makes the picture lighter or darker by changing the aperture. (And if you have auto ISO enabled, it can also change the ISO.)

Afterword

And now?

Now that you have read the book, pause, and read it again. Then, read it again. All the while of course, practicing the techniques, finding the menu entries, and honing your skills.

So now you will need to go practice. Then, practice a little. Then, practice. Read my daily www.speedlighter.ca column as well. Google things. Join a camera club. Take additional courses.

Did I mention practice? But keep doing it—it is *so* worth it. Years ago, famous Parisian photographer Robert Doisneau wrote:

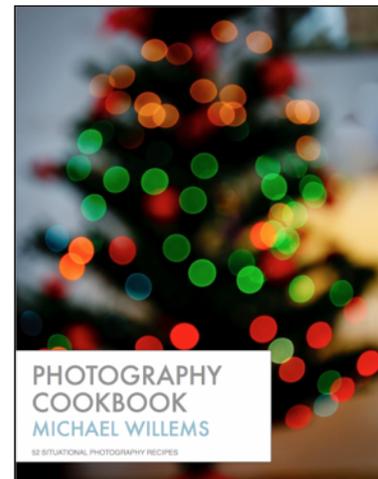
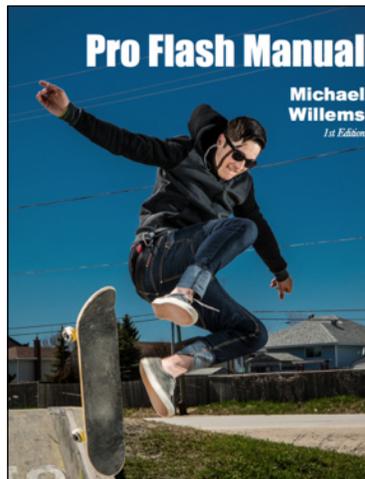
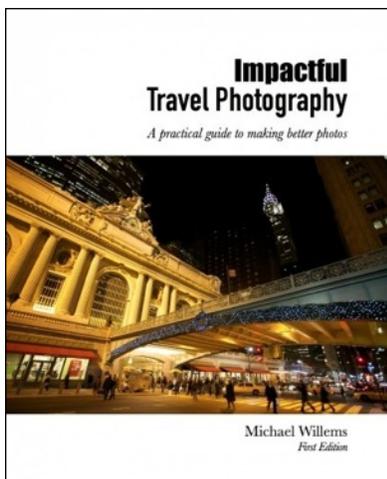
"A memory from my youth comes back to me. You go into the woods on a bike, with a girl. There is the smell of heather, you can hear the wind in the fir trees, you don't dare tell her about your love, but you feel happy, as if you were floating above the ground. Then you look at the clouds beyond the trees and they are fleeting. And you know that within an hour you'll have to go home, that tomorrow will be a working day. You wish you could stop that moment for ever, but you can't, it is bound to end. So you take a photo, as if to challenge time. Maybe the girl will move to another town and you will never see her again, or you will see her changed, tired, humiliated by her everyday life, working as a salesgirl in some shop, with a boss always shouting at her. To me, this desire to preserve the moment seems justified, in spite of that German priest mentioned by Gisèle Freund, who pretends that the photographic image is a sacrilege."

Nothing I could say would express it better than that.

And some practical advice:

Send feedback: all buyers of the First Edition will be entitled to the future Second Edition, which will incorporate some extensions you have asked for, plus any needed corrections. Please Email michael@cameratraining.ca with subject line “Book Feedback”.

If you liked this book, now also consider my other books: you are ready for them! See www.michaelwillems.ca/e-Books.html



About The Author

An award-winning photographer, Michael Willems shoots for families, companies, newspapers, magazines, executives, sports clubs, fashion models, stock



sites, and government. He understands engineers, because he is one: he has a BSc(Eng) in Electronic Engineering. As a photographer, he is a member of NPAC, is accredited with PPOC, and has earned LPPO licentiate status.

Michael is also one of Canada's most popular photography coaches and the author of the popular "Advanced Flash", "Event Photography", and "Travel Photography" signature seminars.

A keynote speaker at large events, he teaches privately; to small groups; and at the Faculty of Continuing and Professional Studies at Ontario's *Sheridan College*, and at other schools. He also taught for six years as senior instructor at Canada's largest school, the *School of Imaging*, and he teaches his signature seminars at Vistek. He has written a regular series of photography articles for Canada's premier photography magazine, *Photo Life*, and not least, he writes his own popular daily photography teaching blog, www.speedlighter.ca.

Michael has worked in 38 countries on 5 continents; from Iraq to Israel; from China to Nigeria; from Australia to Sweden. He has taught his signature courses in a number of countries worldwide.