Izzy Learned to be a Photographer

... and you can too.

A story about photography basics by Bruce Philpott

My granddaughter Izzy was visiting us when she was eleven years old, and she looked at a photo I'd taken of my metal sculptor wife grinding metal. "How did you get those sparks to be streaks?" she asked.

Controlling motion blur: Shutter speed

I thought that was a pretty perceptive question for a kid her age, so I had her use her eyes as a "shutter" to help me answer it.

"I'm going to move my hand across in front of your face like this and I want you to close your eyes and open them when I tell you, then close them when I tell you, OK?"

As I moved my hand, I said, "Open-Close. How far did you see my hand move?" She said she'd only seen it move "this far" (a couple of inches). Then we repeated the experiment and I said, "Open.... *(pause)* Close."

She said, "I get it... I can see your hand move further when I use a long 'shutter speed'... That's what makes the sparks streak. Cool!"

"Yes, **things blur more at a slow shutter speed**," I said. "Even moving the camera while taking the picture will cause things to blur ."

I explained that the time a shutter was open (the shutter speed) was expressed in fractions of a second. "1/60th of a second is twice a long as 1/125th of a second; 1/1000th is half as long as 1/500th, get it?" I was pleased that she'd caught on so quickly, and went back to whatever I'd been doing.

Izzy is a photographer in her twenties now and she learned the basics of photography when she was only 11 years old. I'm telling you about how she learned in hopes that you'll be able to follow along with our experiments and lessons and develop an understanding and love of photography just as she did.

We started out with a camera in full Manual mode. Please read the owner's manual for your own camera and become thoroughly familiar with where its adjustments are, since I'm not using your specific camera in these lessons. Then follow along with us!

f/5.6

Smaller number, larger opening
Fewer things in focus

f/16

Larger number, smaller opening
more things in focus

Controlling depth of field: Aperture

The next day she said, "Sometimes I see a picture where the person (subject) is in focus and that's all that's in focus… everything else is blurred, but in other photos everything is in focus. Does the photographer have control of that?"

I took a lens from an old film camera and showed her we could change the size of the opening in the middle of the lens (by twisting the outside of that lens).

I explained that the opening which lets light through the middle of the lens is called the "Aperture," and that the larger the aperture the less was in focus in the picture.

"I think I understand... *Show me!"* she said.

Applying this to the camera

I got out my old Canon 20D camera and showed her how the aperture was adjusted on the body of that camera, as was the shutter speed.

"Look through the camera's viewfinder eyepiece and you'll not only see the scene you're photographing, but some very important numbers: the f-stop and shutter speed. Cameras often display other, less important information, too."

She said, "I don't see any fractions in the viewfinder. Which of these numbers is the shutter speed?" I explained, "An easy way to tell the shutter speed number as you increase and decrease it is that (even though it represents a fraction) all of the shutter speeds are whole numbers. Just imagine a one and a slash (1/) in front of them.

You can tell the aperture numbers because many of them will be expressed with a decimal point such as 4.5 or 5.6"

"Now that we're looking through the camera, let's get back to how much is in focus... **The larger the aperture, the smaller the f-number.** It's just backwards from the way you'd think it would be. The size of the aperture is expressed in f-numbers. The larger the f-number, the smaller the aperture. Notice how it's written: an f then a slash and then a number... like a fraction. Which is larger, 1/4th or 1/8th? Right, 1/4th is much larger, even though that bottom number is a lower number.

"The 'amount in focus' we're working with here is called 'Depth of Field' (DOF). The way I remember it is to think: ***At f/2 there are two things in focus; at f/16 there are 16 things in focus.*** You need to keep this in mind, because **you won't SEE any difference in depth of field when you look through the viewfinder!** On this camera, you can press the Depth of Field Preview button and you'll see how deep your depth of field is," I explained.

"When I set the aperture to f/16 and press that depth of field preview button it just goes DARK," Izzy said. I told her that was because f/16 lets in less light. Our cameras do us the favor of letting us see the bright picture in our viewfinders all of the time. Only when we press the shutter does the aperture "stop down" to whatever setting we chose. Then the shutter opens and closes (taking the picture) and the aperture opens fully again.

"So the shutter speed controls how much motion blur you get in the picture and the aperture controls how much is in focus," she said.

I told her she was correct and that, in addition to that, **the shutter speed and the Aperture are both ways you can control the amount of light that goes into the picture.** Too much light and the picture will be "over exposed" (too light); Too little light and it will be "under-exposed" (too dark). We'll get into a third way to control the light once we have a better understanding of these two methods.

We went outside together (where there was more light than in the house) and we took a few experimental pictures using large and small apertures (of the same scene) and compared them. We also took pictures of moving subjects using fast and slow shutter speeds and compared those.

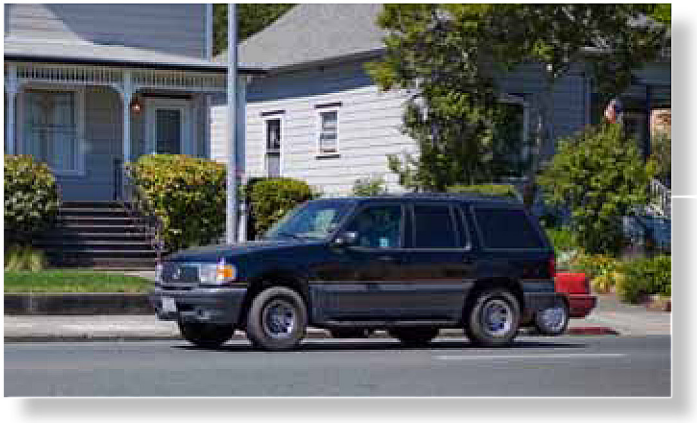
In order to see what f-stop and shutter speed (or any camera adjustment) do, we set the camera to Manual mode. Otherwise, the "brain" of the camera will try to compensate for everything we do, thwarting all of our attempts at learning.

Using the light meter; balancing f-stop and shutter speed

I showed Izzy the light meter "needle" in the viewfinder eyepiece and explained that for most purposes she was to center that needle. If she wanted to increase her shutter speed she'd have to open her aperture more, etc. Immediately she wanted to know about the "other" exposures that didn't fall into my "most purposes" comment. I told her to take lots of pictures and she'd know when it didn't work to center the needle and to come to me when it didn't work. There are a lot of f-stop and shutter speed combinations which will give you a good exposure. You have to balance f-stop against shutter speed to do so,

On the right page here, you see a nicely exposed picture of a moving SUV, "frozen" on the street with a fast shutter speed. If we slow down

There are many f-stop / shutter speed combinations which will give you a proper exposure.



Fast shutter speed: 1/2500th sec. freezes the action.

Over exposed

A slower shutter speed: 1/30th sec. The longer shutter speed lets more light in, over exposing the picture.

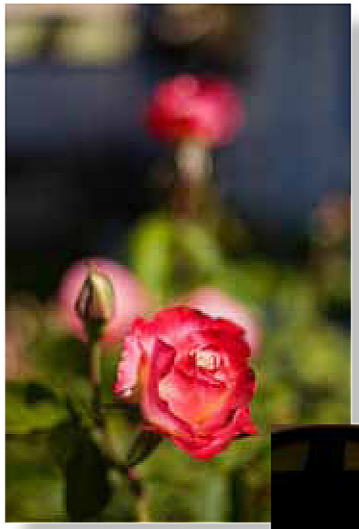
Closing the aperture a bit (until the exposure meter needle is centered again) compensates for the longer shutter speed and gives us a good exposure of this car (intentionallyblurred) in motion.

the shutter speed (to intentionally blur the car's motion), that lets in much more light (middle photo), over exposing the photo so we have to "stop down" the aperture to a higher number in order to re-center that light meter needle.

The top picture of the rose at the right has a very shallow depth of field because it was taken at f/2. If, instead of this shallow depth of field, we wanted a very deep depth of field (a lot in focus), we could go towards f/16.

In Manual mode, if we just change the aperture from f/2 to f/16 and take the picture, a glance at the LCD (liquid crystal display) review on the back of our camera shows us a terribly dark picture.

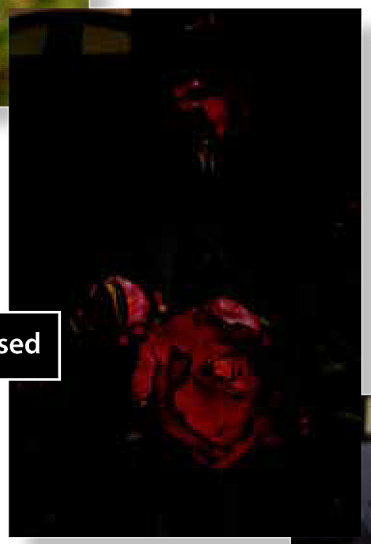
If we also increase the length of time the shutter is open, though, allowing more light into the picture... re-centering the light meter needle, we get another good exposure, this time with a deep depth of field (bottom picture).



Here, an aperture of f/2 gives us a wonderfully shallow depth of field.

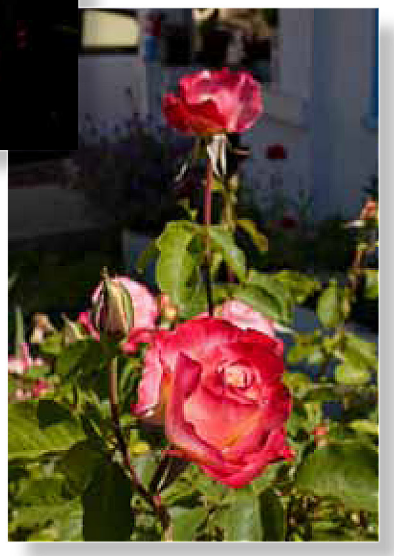
Varying f-stop changes depth of field.

Varying shutter speed compensates for the change in light reaching the sensor.



Under exposed

Going to f/16 makes the picture terribly dark.



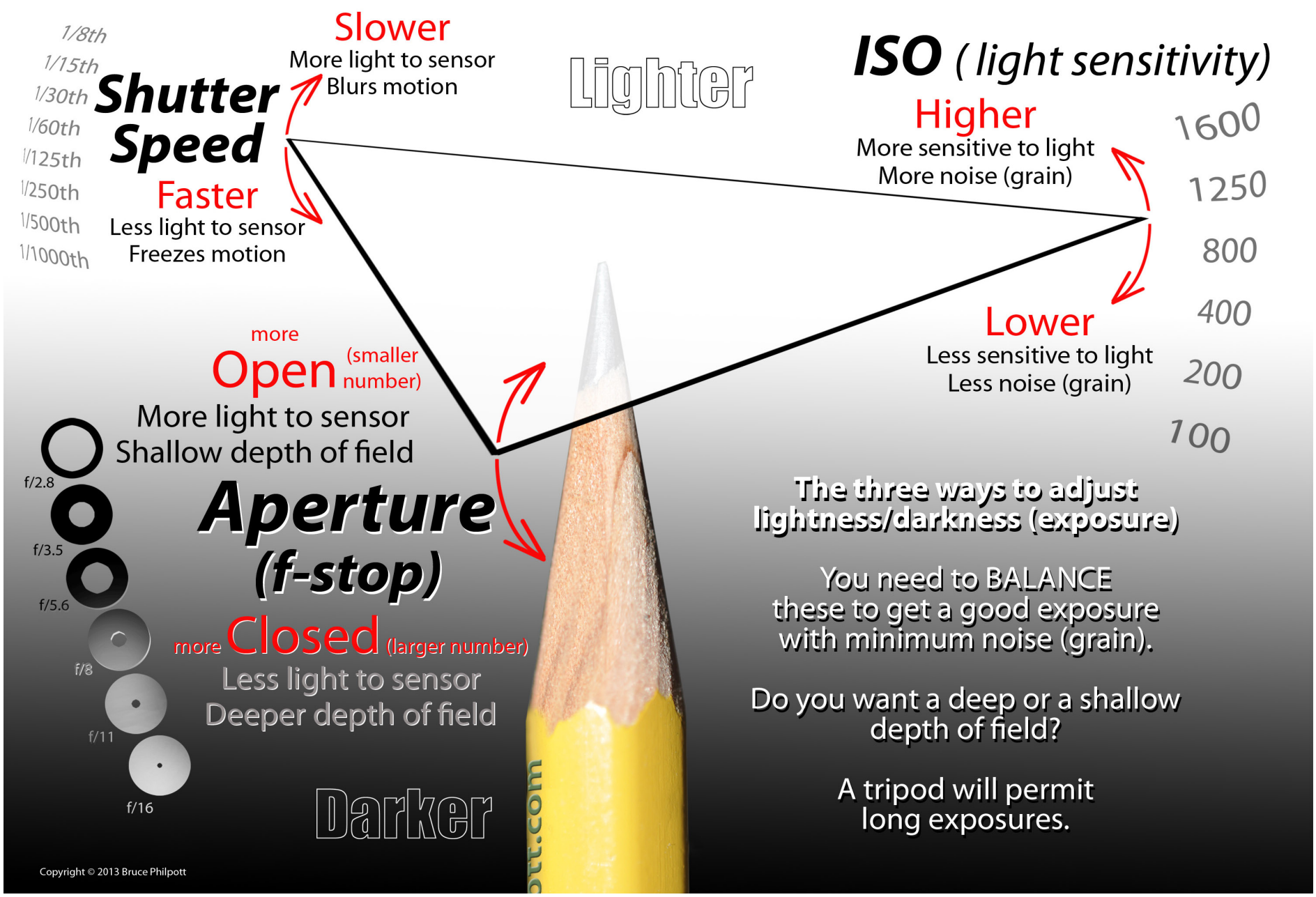
We can stay at f/16 if we slow the shutter speed to allow more light to reach the sensor.

The third, very important method of controlling how much light reaches your sensor (how light or dark your picture is) is ISO.
The initials aren't important; in fact various initials have applied to this adjustment over the years: ISO, ASA, DIN. They just stand for the organizations which set standards for the amount of light. See the Exposure Triangle on the next page. With my permission, the US Defense Information School uses this diagram in training their photographers.

See your camera's manual to learn how to increase and decrease your ISO as needed. When you're stuck with the need for a small aperture to have the things you want in focus, but also need a higher shutter speed so you don't get motion blur, you have to increase the ISO. Otherwise, leave it at its minimum for higher quality.

Early digital cameras weren't as good at performing at increased ISOs. *(continued on page 6)*

Balancing the Exposure Triangle



An ISO of 1600 on an older (or inexpensive) camera might yield a very grainy photo. Experiment with your camera to find the quality you're after.

Having taught Izzy those two most creative adjustments on the camera (f-stop and shutter speed) plus adjusting ISO, I sent her off to have fun and take as many pictures as she wanted.

Learn how to take a bad picture

"Before you go, though, I want to teach you how to take a bad picture! If you don't know how to take a bad picture, you won't really be able to take a good picture.

"To take a bad (poorly composed) picture, you put your subject dead center in the middle of the viewfinder, with the horizon right at the center, and you get so far back from your subject that you can barely tell who it is or what they're doing. I want you to come back with at least one example of a bad picture."

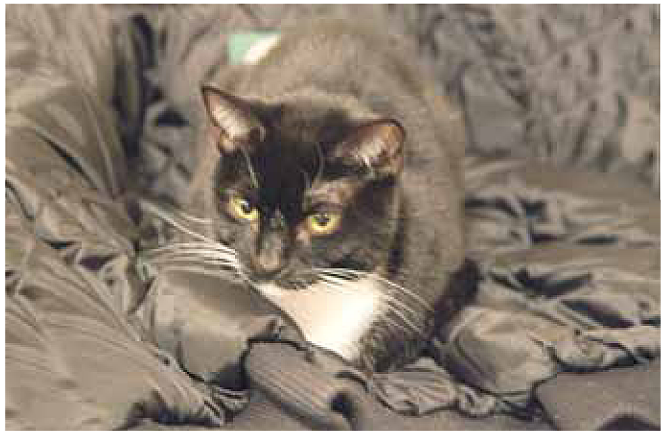
I told her that the memory card in the camera would hold all of the pictures she'd take during the whole afternoon. I told her, "Make a lot of mistakes! We learn more from our mistakes than we do from accidentally getting things right."

When she returned from an hour or so of taking pictures, I downloaded all of her pictures onto my computer so we could look at them all at once and compare them.

"Here, look... I took a couple of bad pictures like you asked me to," she said, pointing to them. In looking at the other pictures she'd taken, I saw some photos which were too light or too dark, but I saw that she'd re-taken those photos exposing them correctly. We reviewed what camera adjustments she had made to fix these over/under exposures. I could see that as she gained experience she had fewer mistakes centering the light meter's needle.

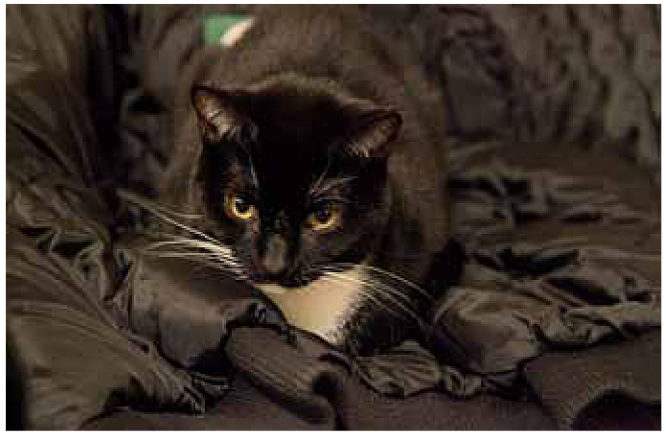
Go ahead and disagree with the light meter

"I didn't like how these photos turned out at all," she said, pointing to several attempts to photograph our very black cat lying on the black lining of a jacket. "I centered the exposure meter needle, and nothing worked. I changed the f-stop and re-centered the needle and it's still over exposed. I changed the shutter speed and re-centered the needle... STILL over exposed. Why wouldn't it work?"



The camera's exposure meter wants the picture to look like this middle gray.

I explained that the camera's needle was indicating what would make an 18% reflectance scene (I showed her a Kodak gray card).



If you want the picture darker, you have to force the camera to "under" expose the scene

I asked her if the black cat and black fabric were a middle gray, and she said, no, they were a very dark scene.

"You're the photographer, Izzy, the camera's not the photographer. The camera doesn't know that this is a dark scene. As I said, it just tries to make everything that medium tone. The camera's exposure

meter wants the picture to look like this middle gray. If you want the picture darker, you have to force the camera to "under" expose the scene You have to TELL it to be lighter in this case. How could you have made these photos darker?"

"Well, I could use a faster shutter speed or a smaller f-stop to make it darker, but then the light meter needle wouldn't be centered," she said. I explained that this was one of the situations where the photographer had to decide not to center the light meter needle. In this case we want to force the camera to give us what it thinks is an under exposed picture... one which, to our eye, looks just like the scene we're seeing.

"Now imagine a white bunny in the snow. Is that a medium tone? No, it's an extremely bright scene, isn't it? Imagine that you take a picture of that scene and your camera's LCD shows you a very under exposed picture. What would you do?"

"OK, to make the picture lighter I can use a slower shutter speed or a smaller number f-stop, and I wouldn't care if the light meter is centered or not. Is that what I should do?"

I responded that she was right. She was already thinking better than the camera could. She was taking charge of how the pictures would turn out.

Hire a couple of servants

When she'd been shooting in Manual mode for a couple of weeks, centering the exposure needle most of the time and deciding when the picture would benefit from having the needle more to the plus or minus side on the meter, I told her I was going to give her a couple of "servants."

These servants would do the simple half of this f-stop and shutter speed adjusting. I explained that even though she was going to delegate these duties she had to keep a close eye on how well the job was being performed. The servants I gave her were **Aperture Priority** semiauto mode and **Shutter Priority** semi-auto mode. I explained that when depth of field was her "priority," she should be in Aperture Priority; When motion blur was her priority, she'd want to be in Shutter Priority.

I explained two important things about using these servants. First, she had to keep an eye on what adjustment they were giving her, and compensate as needed. Second, if she wanted the scene darker or lighter, she had to use the camera's Exposure Compensation wheel to make the scene as light or dark as she wanted.

Since then she's been learning about increasing her ISO when absolutely necessary, only as much as needed. She's also learned various means of supporting her camera for longer shutter speeds, and about panning with the action using a slow shutter speed. She has learned to manage an ETTL flash, using bounce light instead of direct flash.

Good habits prevent problems

She has picked up several of my photography habits. She noticed that I have a fixed procedure for replacing my camera's memory card. Now she does as I do: I change my card before it runs out of space, preventing me from needing to do this right when more photo opportunities happen and missing important shots. I always have a spare card in my left pocket (even though there may be more in my bag). I have it in my hand when I open the camera's card door, and I insert a new card immediately after removing the card that's nearly full. I check my LCD to see what's on this new card (to be sure it's not images I haven't uploaded to my computer yet) and then I format the new card and place the filled card in my right pocket. I always carry a freshly charged camera battery and as soon as I get home with a battery I've had to replace, I put it in the charger.

Watching me, she also picked up little tips such as not letting a camera strap dangle off a table. That's just asking for something to come along and accidentally yank it off the table. In a restaurant, she

hangs her camera by its strap over her thigh when she's eating. That way it's out of the way and won't be forgotten when she leaves.

Become more than just a technician

All during these lessons, I made sure that she wasn't merely becoming a competent technician/camera operator, but that she considered what the final image was going to look like. I had her imagine a picture frame surrounding what she saw in her viewfinder.

Starting with learning how to take a "bad" picture, she learned to mentally divide her viewfinder into thirds horizontally and vertically (like a tic tac toe game) and to try to put the horizon near one of those "thirds" lines and to have her subject near an intersection of those lines, facing into the picture with more space in front of the subject than behind. She may forget it's called the "Rule of Thirds," but she knows it's a good way to start arranging things in her viewfinder.

Izzy now knows to either leave just enough "breathing room" around her subject or to crop it extremely tightly. Anything in between looks as if it's done accidentally.

I've explained that knowing how to operate a camera and knowing the "rules" of composition are similar to learning about the various strings on a guitar and the basics of chords. This knowledge doesn't make you a musician. A musician plays his instrument with feeling, interpreting the song and making it "his." All of this photographic knowledge has to be in the back of your mind, operating automatically, enabling a photographer to interpret the scene he or she sees, the way they want to express it.

She has learned to interact with her subjects. Now when I'm taking a candid photo of a family member, she'll come near me and ask them a question, causing them to look up naturally in the direction of the camera, making the shot possible for me.

Izzy started using a digital single lens reflex (DSLR) camera when she was 11. She graduated from University of California at San Diego in 2017 and is now in her twenties. When taking pictures, she works toward achieving the images she sees in her mind.

I hope that my story of how Izzy learned photography will inspire you experiment to with your f-stop and shutter speed in Manual mode until you see how they affect your picture. You'll be able to supervise your semi-auto "servants" effectively and not allow them to make decisions you don't like. You can further experiment with ISO, enabling you to capture more scenes with available light. I hope you'll assert your own artistry with the camera and create photos which are your interpretation of the scene as you see it.

You're just about ready to start working with off-camera flash!
I recommend books by Joe McNally on that topic:

The Hot Shoe Diaries : Big Light from Small Flashes
and
The Moment It Clicks :
Photography Secrets from One of the World's Top Shooters

Other tutorials may be found on my web site:
http://brucephilpott.com/photos/index.htm#tutorials

Photos by Izzy Clegg