A FREE BOOK FROM CHOBIAL

Learn Photography with Chobial

From your first photo to a whole roll: light, composition, exposure, phone cameras, film looks and editing, one step at a time.

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Contents

GETTING STARTED

0. Meet your camera

PART 1 · PHOTOGRAPHY BASICS

1. What a photo is
2. Seeing a picture
3. Composition, part one: placing things
4. Composition, part two: leading the eye
5. Composition, part three: space and balance
6. Composition, part four: viewpoint, pattern and moment
7. Light
8. Exposure: how bright the photo is
9. Shutter speed
10. ISO and noise
11. Aperture and depth of field
12. The exposure triangle
13. The histogram and your highlights
14. Focus and sharpness
15. Color and white balance
16. Flash and light you bring

PART 2 · PHONE PHOTOGRAPHY

17. Your phone's cameras
18. Holding still and pressing the shutter
19. Tap, lock, adjust
20. What your phone does without asking
21. What a phone can't do
22. File formats

PART 3 · FILM LOOKS, DEVELOPING AND FINISHING

23. What makes film look like film
24. Choosing a film for the light
25. Black and white
26. Developing a photo, step by step
27. Editing part of a photo
28. Describe Edits and your own looks
29. Photos from your other camera
30. Choosing your best photos and telling a story
31. Sharing your photos
32. Keeping your photos safe
33. Printing

PART 4 · PHOTOGRAPHING REAL LIFE

34. Photographing people and places with respect
35. Portraits
36. Selfies and group photos
37. Street
38. Landscape
39. Travel and the city
40. Food and cafés
41. Night and city lights
42. Pets and children
43. Weather
44. Architecture

THE END OF THE BOOK

45. Final project: shoot a roll

Reference pages

Getting started

0. Meet your camera



PHOTO Ben Shahn, *Itinerant photographer in Columbus, Ohio*, August 1938. Library of Congress, Farm Security Administration/Office of War Information collection.

Look at the camera in this photo. It's a plain wooden box on a tripod. There's a lens on the front, and the photographer has pinned his sample prints to the box.

That box is a camera in its simplest form. It lets light in and records it. The phone in your hand does the same thing, in a much smaller box.

A camera is a box that records light

Light comes in through the lens. Something inside the box records it. Today that something is a sensor. A sensor is the part of the camera that turns light into a picture. Chapter 1 explains light, the lens and the sensor properly.

Every control in this book changes one of three things:

- how much light comes in
- how long the light comes in for
- how the light is turned into colors

Your phone decides all three by itself if you let it. This book is about learning to choose them yourself. Once you know what each control does, you can decide what your photo should look like, and I think that's when photography gets fun.

In Chobial

On first launch, Chobial offers **Take the Tour** or **Start Shooting**. The tour is one minute long and runs on the real viewfinder. The viewfinder is the live picture on the screen that shows what the camera sees.

Here's the camera screen from top to bottom, on an iPhone with a Dynamic Island. The Dynamic Island is the black pill at the top of the screen.

1. Look on either side of the island. On the left is the capture format: **ProRAW**, **RAW**, **HEIF** or **JPEG**. Tap it to switch to the next one. Chobial shoots RAW by default. A RAW file is the full data from the camera's sensor, before any color style is added. ProRAW, HEIF and JPEG are other kinds of photo file, and chapter 22 explains them all.
2. On the right of the island is the loaded film's **badge**. A film in Chobial is a color look modeled on a real film stock. Tap the badge to see a row of all your films. If your phone has no island, the format and the badge sit in the exposure line instead.



SCREENSHOT the top of the camera screen, with the format on the left of the Dynamic Island and the film badge on the right

3. Under them is the **exposure line**. It shows **ISO**, **shutter speed** and **EV**. - ISO is how much the camera brightens the light it gets (chapter 10). - Shutter speed is how long the camera lets light in for each photo, for example 1/125 s (chapter 9). - Aperture is the size of the opening the light comes through. A phone's aperture never changes, so it isn't a setting and the exposure line leaves it out (chapter 11). - EV is how much

brighter or darker than the camera's own choice the photo will be (chapter 8).

4. Tap any value in the exposure line to open its dial. A value you set yourself turns orange. When the camera can't reach a value, that value turns red. For example, set the shutter to 1/2000 s and push EV to +3 in a dim room. ISO can't go that high, so ISO turns red. Other labels join the line while they're on, for example when the flash is on.



SCREENSHOT the exposure line with ISO, shutter speed and EV, one value in orange

5. Below that is **the picture**: the scene, developed live with the loaded film. Swipe left across it for the next film, or right for the one before. The new film's name and a short description show for a moment. You can change the film at any time, even after you take the photo.
6. Under the picture is a row with three buttons. The round button on the left is **flash**. Tap it to go from Off to Auto to On, and back to Off. In the middle is the shutter. On the right is **Controls**, the round button with sliders on it.
7. Along the bottom, your latest photo is on the left. The **lens pill** in the middle shows 0.5×, 1×, 2× and so on, depending on your phone. **Flip**, bottom right, switches to the front camera. Tap it again to go back.



SCREENSHOT the row under the picture and the bottom of the screen, with flash, shutter, Controls, latest photo, lens pill and flip

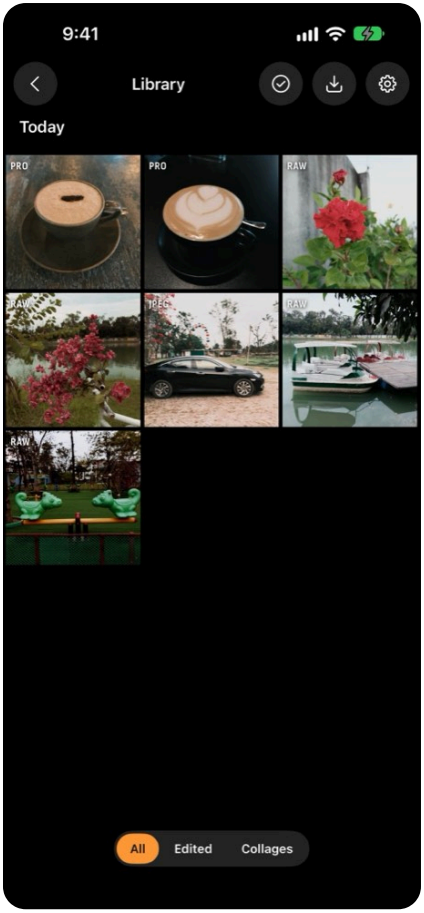
Now take your first photo:

1. Point the phone at anything and **tap the shutter**.
2. Watch the shutter ring. An orange arc inside it shows photos that are still being developed. Photos develop in the background, so you can keep shooting while the last one is still appearing in the corner. If the arc fills up, the shutter waits a moment for the last few to finish.

3. **Hold the shutter** for a burst. A burst is a fast run of photos taken while you hold the shutter. A counter above the shutter shows how many frames you've taken. Let go to stop.
4. Tap your latest photo, bottom left, to open your photos in the app's library.

On iPhone, **Camera Control** and the **volume buttons** take a picture too (chapter 18).

Every photo keeps its original. So you can pick another film for it later in the editor, or develop it again. If you see NO PHOTO in red, that lens or camera can't take a photo right now. Try another lens.

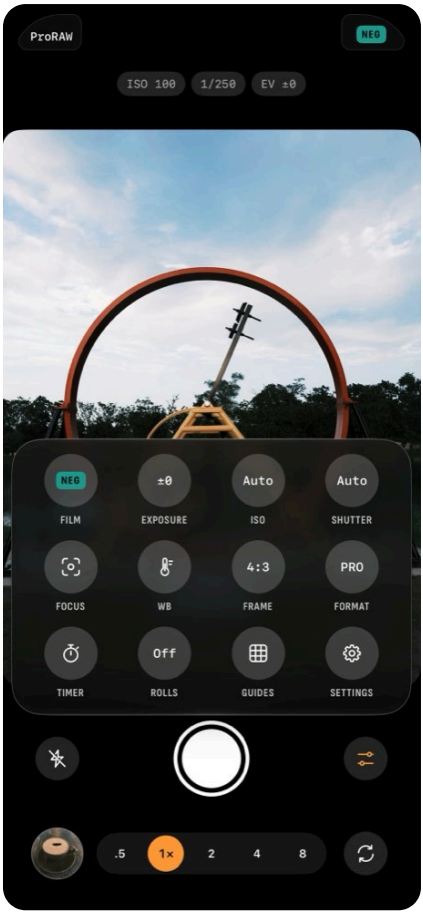


SCREENSHOT the library open after the first photo

Last, open the Controls panel:

1. Swipe up on the camera, or tap **Controls**. The panel opens on a grid of tiles, for example Film, Timer, Format, Frame, Guides, Focus, WB and Settings. **Controls** stays orange while the panel is open.
2. Swipe down, tap the black space around the picture, or tap **Controls** again to put the panel away.

Anything you set by hand stays set when the panel is put away, and the exposure line still shows it in orange.



SCREENSHOT the Controls panel open, showing its grid of tiles

The full tutorial is in **Settings › Tutorial**. Open Settings from its tile in Controls. The first chapter is **The Basics**, and its first lesson is **The camera at a glance**.

> **On Android:** Android phones have a camera hole where the iPhone has the Dynamic Island. The format and the film badge sit in the "ears" on either side of the camera hole. The format choices are RAW, HEIF and JPEG, with no ProRAW. RAW is saved as DNG, on phones whose camera gives RAW. Either volume key takes a picture, and there's no Camera Control. **NO RAW** in red means that lens has no RAW, so Chobial takes HEIF or JPEG instead. Everything else in this tour is the same.

See it

Take the same scene twice, once in bright light and once in dim light. Leave everything on Auto, and look at the exposure line each time.

The numbers will be very different. On an iPhone 17 Pro Max (24mm lens, ƒ1.8), bright light read 1/8547 s at ISO 64. Less light read 1/30 s at ISO 640. The camera needed enough light for the photo, so with less light it kept the shutter open longer and raised the ISO. You'll learn what those numbers mean in chapters 9 and 10.

Common mistake

You tap the picture to focus, and your finger slides up or down a little. That drag changes EV. Dragging up makes the photo brighter, and dragging down makes it darker. Every photo after that looks too bright or too dark until you tap the picture again, and you can't tell why. On iPhone, the change even stays after you close the app.

To spot it, look at EV in the exposure line. At the camera's own choice it reads ±0. If it shows a number like +1.0 or −0.7 in orange, you changed it.

To fix it, tap the picture again, which puts EV back to ±0. Or tap EV in the exposure line and tap **Reset** on its dial. The same goes for any other value in orange: tap it and tap **Auto** on its dial to give it back to the camera.

Try it

Take ten photos of anything, without touching a single setting.

1. Open Chobial.
2. Leave everything on Auto.
3. Take ten photos. Mix bright places and dark places, and get some sky in a few of them.
4. Tap your latest photo, bottom left, to look at all ten.

Don't delete any of them, even the bad ones. You'll come back to them in chapter 13.

PART 1

Photography basics

1. What a photo is



PHOTO Ansel Adams, *Evening, McDonald Lake, Glacier National Park, Montana*, 1941–42. National Archives, Records of the National Park Service.

Ansel Adams made this photo in 1941–42, for a project to photograph US national parks. It shows a calm lake at Glacier National Park in Montana. Mountains run across the middle, and the sky is bright and full of clouds.

Now look at the bright patches in the water. They're the sky. The water has no light of its own. The brightness in the lake is the sky's light, bounced off the water into the lens.

A photo is a record of light

A photo is a record of light, not of things. The camera never touches the lake or the mountains. It records the light that comes from them into the lens.

Where the light comes from

Light starts at a source, like the sun, a lamp or a screen. It hits things and bounces off. Each thing takes in some of the light and sends the rest away. A red apple sends back mostly red light and takes in most of the rest. White things send back most of the light. Black things take in most of it.

Some of the light that bounces off things travels into your eye, or into the camera. With no light, there's nothing to record. A photo of a dark room with no light in it is black.

Look at the mountains in Adams's photo again. The far ones look paler than the near ones, but they're the same kind of rock. There's more air between the far mountains and the camera, and the air scatters light. So the light that comes from them is different.

How the lens makes a picture

The lens is curved glass or plastic. It bends the light so the light makes a small, sharp picture on the sensor. That picture is upside down, and the camera turns it the right way round for you.

The oldest version of this is the camera obscura. The name is Latin for "dark room". A camera obscura is a dark room with a small hole in one wall. Light coming through the hole makes an upside-down picture of the outside on the opposite wall. People knew about it for centuries before photography, and the word "camera" comes from it.

Your phone is a very small dark room with a lens instead of a hole.

How the sensor turns light into a photo

The sensor is covered with millions of tiny light-sensitive spots called pixels. During the photo, each pixel measures how much light reaches it. More light on a pixel means a brighter spot in the photo.

Over the pixels are tiny red, green and blue filters, so each pixel measures one color. The phone combines neighboring pixels to work out the full color of every spot.

A megapixel is a million pixels. The main camera on recent Pro iPhones (iPhone 14 Pro and later) has a 48-megapixel sensor. That's about 48 million pixels.

Film did the same job

Before sensors, a strip of film sat where the sensor is. Film is plastic coated with chemicals that change when light hits them. (Chobial's films are something else: they're color looks.)

Adams made the opening photo on film. It's black and white, so it records only how much light came from each part of the scene, with no color.

Exposure: how much light the sensor collects

Exposure is the amount of light the sensor collects for one photo (chapter 8 goes deeper). The camera controls it with how long the light comes in (shutter speed) and how much it brightens what it gets (ISO). On a phone the aperture is fixed, so shutter speed and ISO do all the work. In Auto, the camera measures the light and picks both for you.

Here are two of my photos, both taken on an iPhone 17 Pro Max (24mm lens, ƒ1.8), with the camera choosing the settings:

- Palm trees and a lake in bright sun: **1/38462 s at ISO 80**.
- Two foldable phones on a dark table indoors: **1/30 s at ISO 1600**.

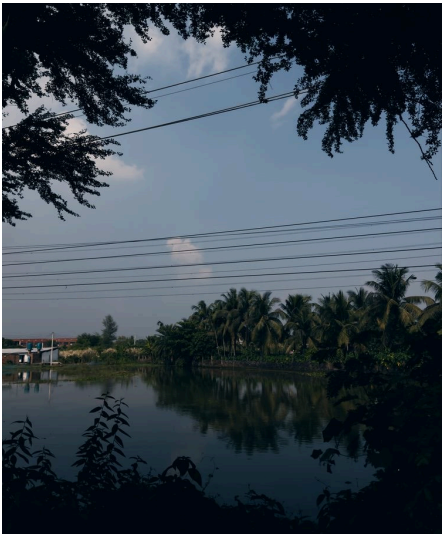




PHOTO PAIR Masnun's palms-evening.jpg, 1/38462 s, ISO 80 / Masnun's two-foldables.jpg, 1/30 s, ISO 1600

The indoor shutter speed was about 1,280 times longer, and the ISO was 20 times higher. Together, that means the camera got about 25,000 times more light from the sunny lake than from the table. Both photos still came out at a normal brightness. The camera made up the difference with the shutter speed and ISO.

The same scene changes when the light changes

The lake doesn't change between noon and sunset. The light does, so the photo changes.

At noon the sun is high, and the light comes from above. Shadows are short and fall almost straight down. The light is white and strong.

Near sunset the sun is low. The light comes from the side, so shadows are long. The light also passes through much more air on its way to you. Air scatters blue light more than red light, which is also why the sky is blue. So

much of the blue is gone by the time low sunlight reaches you. The light looks yellow, orange or red, and it's much dimmer (chapter 7).

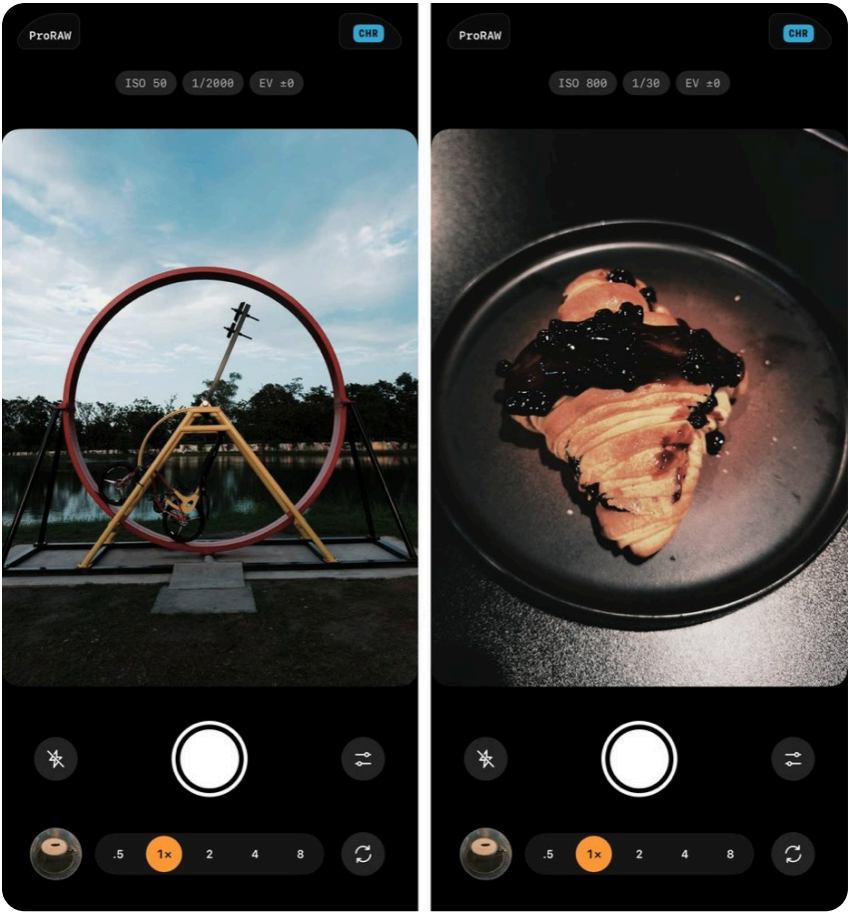
A white wall looks orange in a sunset photo because the light hitting it is orange. The wall is still white.

Your eyes and brain adjust to bright and dim light, and to the color of light. So you often don't notice how much the light has changed. The camera records the light that's really there (chapter 15).

Adams called his photo "Evening". At noon, the same lake would be lit from above, and the photo would look different. The lake and the mountains would be exactly the same.

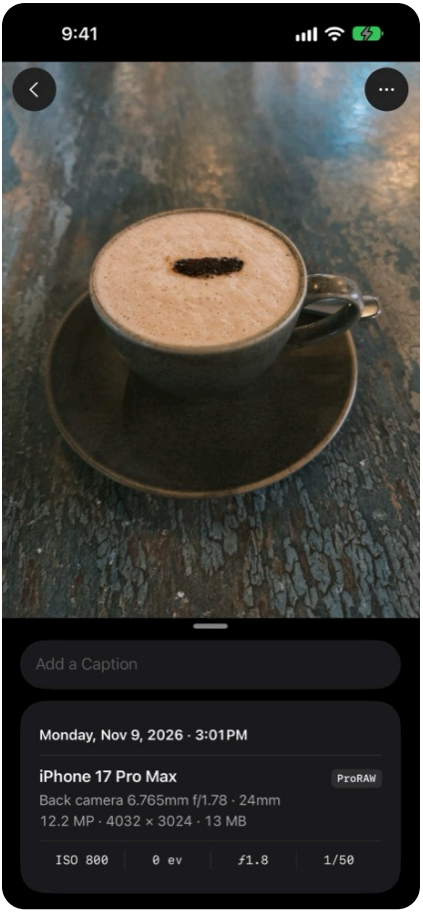
In Chobial

1. Open Chobial and find the **exposure line** under the Dynamic Island. It shows **ISO**, the **shutter speed** and **EV**, for example "ISO 64", "1/8547" and "EV ±0". Phones without an island show the same line.
2. Check that no value is orange and that EV reads ±0. The camera's own values show in gray. A value you set yourself shows in orange.
3. Point the phone at a bright window, but not straight at the sun. You'll see a short shutter speed and a low ISO.
4. Turn slowly to a dark corner of the room. The numbers change as you move, because the camera keeps measuring the light. Watch the shutter speed get longer and the ISO go up. Times of 0.3 s or longer show in seconds, like 0.5".
5. Look at the picture on the screen. It looks about as bright in both places, because the camera makes up for the change in light. The numbers show you how much it had to change.



SCREENSHOT the exposure line pointing at a bright window / the exposure line pointing at a dark corner

6. Take one photo at the window and one in the corner.
7. Tap your latest photo, bottom left, to open it. **Swipe up** on the photo. The camera card shows the ISO, EV, aperture and shutter speed the photo was taken with.



SCREENSHOT a photo's details after swiping up, showing the camera card

The camera card is the one place in the app where you see the aperture. It's the same number on every photo from the same lens, because the aperture is fixed.

See it

Take the same view from the same spot twice: once at noon and once near sunset. The palm trees and lake from my photo would work well.

At noon, the shadows are short and fall almost straight down, and the light is white and bright. Near sunset, the light comes from the side and the shadows are long. The light looks orange, and the scene is much darker. Check the exposure line each time. Near sunset the camera needs a longer shutter speed or a higher ISO, because there's less light to collect.

The two photos below aren't mine, and they show two different lakes. But they show the same change in the light.





PHOTO PAIR Palm trees by a lake in the middle of the day, with short shadows and white light (palms-noon.jpg). Photo: Luo Jin Hong, Unsplash, Unsplash License. / Palm trees by a lake at sunset, dark against orange light (palms-sunset.jpg). Photo: Chris Marlin, Unsplash, Unsplash License.

Common mistake

Your eyes adjust to a dim room, so the room looks fine to you. Then your photo comes out blurry or grainy, and you can't tell why.

You can spot this before you shoot. Look at the exposure line. A slow shutter speed (1/30 s or slower) and a high ISO (in the hundreds or thousands) mean there's little light. At 1/30 s and slower, your hand shaking can blur the whole

photo (chapter 9). A higher ISO means more noise. Noise is the fine grainy speckle in photos taken in low light (chapter 10).

To fix it, bring more light, or move to it. Turn on a lamp, open the curtains, move your subject near a window, or step outside. Then watch the shutter speed get shorter and the ISO come down.

Try it

Point the camera at five scenes, from bright to dark. For example, try a sunny street (not the sun itself), a place in the shade and a spot by a window. Then try the middle of a room and a dark corner or a cupboard.

1. Leave everything on Auto, with nothing orange and EV at ±0.
2. For each scene, write down the shutter speed and ISO from the exposure line. Take one photo of each scene.
3. Afterwards, open each photo and swipe up to check the numbers it was taken with.
4. Look at how the shutter speed got longer as the light dropped. Find the scene where it stopped getting longer and the ISO went up instead.

Keep the list. Chapter 9 (shutter speed) and chapter 10 (ISO) use the same numbers.

2. Seeing a picture

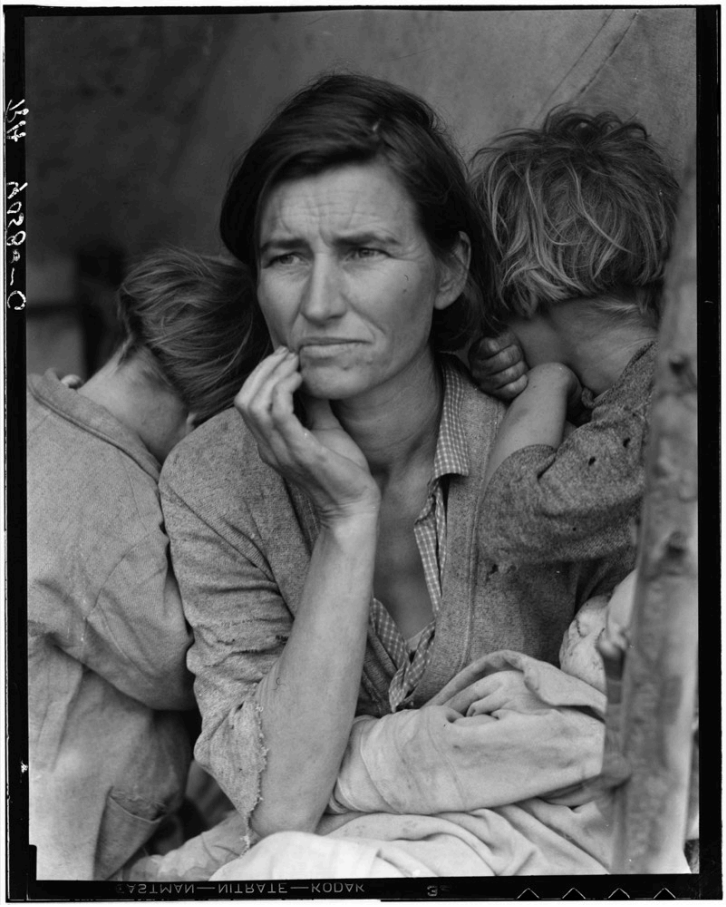


PHOTO Dorothea Lange, *Destitute pea pickers in California. Mother of seven children* ("Migrant Mother"), 1936. Library of Congress, Farm Security Administration/Office of War Information collection.

Dorothea Lange made this photo in March 1936 in a camp of pea pickers in Nipomo, California. (The Library of Congress record says February or March.) She was photographing poor farm workers in the Great Depression of the 1930s, for the Resettlement Administration. It was a US government agency,

later called the Farm Security Administration. The woman is Florence Owens Thompson. She was 32. Lange later wrote, "I did not ask her name or her history."

A mother with a worried face has one hand raised to her chin, and she's looking past the camera. Two children lean on her shoulders with their faces turned away. A baby is in her lap. The four of them fill the frame. The frame is the rectangle of the picture, out to its four edges. There's almost nothing else in it. You don't see a wide view of the camp.

In Popular Photography in 1960, Lange wrote, "I made five exposures, working closer and closer from the same direction." An exposure here means one photo on film. The Library of Congress has a set of photos from that visit, and some wider ones show more of the tent and the camp. The famous one is a close one. Lange didn't stay where she first stood. She walked closer, photo by photo, until the family filled the frame.

Decide what the photo is of

Before you shoot, decide what the photo is of. Pick one main thing. That thing is the subject. If you can't say what the photo is of in a few words, the person looking at it can't either.

"My friend laughing" is a subject. "The park, some people, a dog and the nice light" is a list, and the photo will look like one.

Walk closer to the subject

Most beginner photos are taken from too far away. So walk toward the subject, with your feet. The war photographer Robert Capa is often quoted as saying, "If your pictures aren't good enough, you're not close enough."

Make the background simple

Everything in the frame competes with the subject. So look behind the subject before you shoot. If the background is busy, move. Take a step to the side, crouch, or stand up higher. Try to get the subject against something plain, like a wall, the sky, the ground, grass or a dark shadow.

Then check all four edges of the frame for bits that don't belong. Look for a bin, half a person, a bright sign or your own finger.

Lange's famous photo had one of these bits once. The original negative had Thompson's thumb in the lower right corner, holding a tent pole. A negative is the developed film a photo is printed from. In the 1930s, someone retouched the negative to remove the thumb. If you check the edges before you shoot, you won't need to remove anything later.

Tall or wide: portrait and landscape

A frame can be tall or wide. Portrait means the frame is taller than it is wide. Landscape means it's wider than it is tall. These words are about the frame's shape. You can take a wide photo of a face.

Hold the phone upright for a tall photo. Turn it sideways for a wide one. Then pick the shape that matches the subject:

- **Tall:** a standing person, a tree, a tower, a bottle.
- **Wide:** a beach, a street, a group of people side by side, a long table.

Fill the frame

Let the subject take up most of the picture, so there's little room left for anything else. It's fine to cut off part of the subject, like the top of a head or the edge of a plate. What's left just has to be the part that matters.

Where to place the subject comes in chapter 3, and blurry backgrounds in chapter 11.

In Chobial

Chobial shows frame lines in the viewfinder, so you see the shape before you shoot.

1. Tap **Controls**, the round button with sliders, to the right of the shutter. You can also swipe up on the camera.
2. Tap **Frame**. Each tap goes to the next shape: **4:3**, **3:2**, **1:1**, **16:9**, **65:24**, and then back to 4:3.
3. Hold the phone upright for the tall version of the shape (for example 2:3). Turn it sideways for the wide one.



SCREENSHOT the camera with the 3:2 frame, the area outside it darker, and "3:2" in the exposure line

The shapes are:

- **4:3** is the full shape of the phone's sensor, so nothing is darkened.
- **3:2** is the shape of a 35mm film frame, which is 36 × 24 mm.
- **1:1** is a square.
- **16:9** is the shape of a widescreen TV.

- **65:24** is a very wide frame. It comes from the Hasselblad XPan, a panoramic film camera. Its frame was 65 × 24 mm on 35mm film.

With any other shape, Chobial darkens the part outside the frame. It isn't blacked out, so you can still see someone about to walk into the shot. The shape also shows in the exposure line, for example "3:2". You can tap it there to go to the next shape too.

Chobial still saves the whole sensor. The shape is saved with the photo as a crop. So you can change the shape later, or take the crop off and get the whole picture back.

To change the crop later, in the editor:

1. Tap your latest photo, bottom left, to open it.
2. Tap **Edit** at the bottom.
3. Tap **Crop** in the bar at the bottom.
4. Drag a corner to crop, or drag inside the box to move it.
5. Pick a shape: **Original**, **Free**, **1:1**, **5:4**, **4:3**, **7:5**, **3:2** or **16:9**. Tap the shape again to turn it between tall and wide. 65:24 isn't in this list, so use **Free** for that one.
6. To get the whole picture back, tap the reset button (↺) at the top left of the Crop panel. It also undoes any straightening.
7. Tap the orange **checkmark** at the top right of the panel to finish.

Cropping is handy for fixing a frame, but walking closer is better than cropping a lot. A crop throws away pixels. If the subject was small and you crop it big, it has fewer pixels left to show detail.

See it

Take the same subject two ways. Use a flower, a cup or a friend. For the first photo, shoot from where you first stood. The subject is small in the middle, with a busy background like railings, chairs or a roof.

For the second photo, walk closer and move a step so the subject is against something plain. Now it fills most of the frame.

The two flowers below are different flowers, shot by two other photographers. They show the two results.





PHOTO PAIR A small white flower in the middle of busy dead leaves (flower-busy.jpg). Photo: Chandler Cruttenden, Unsplash, Unsplash License. / A white flower from close, filling the frame against a plain soft background (flower-close.jpg). Photo: Bozhin Karaivanov, Unsplash, Unsplash License.

Common mistake

The subject is small in the middle of a busy scene. You saw the thing you liked, and your eyes zoomed in on it. But the camera records everything in the frame equally.

To spot this mistake, look at the photo on the screen and ask what takes up most of the picture. If the answer is "the background", you're too far away. You're also too far away if the subject would fit in a coin-sized spot in the middle.

To fix it, walk closer before you shoot. Then check the background and the four edges.

Try it

Take one subject and five photos, each a step closer.

1. Pick one subject: a person, a pet, a plant or a cup.
2. Take the first photo from where you are.
3. Take one step closer and take another photo. Repeat until you have five.
4. For the last photo, also check the background and the edges. If something busy is behind the subject, move to the side or crouch.
5. Tap your latest photo, bottom left, to open it. Swipe sideways to go between the five photos. Pick the one where the subject is clearest.

For more practice, try one tall photo and one wide. Or set **Frame** to 1:1 and do the walk again.

Lange did the same walk with the family in Nipomo. She moved closer and closer from the same direction.

3. Composition, part one: placing things



PHOTO Gordon Parks, *Washington, D.C. Government charwoman* ("American Gothic"), 1942. Library of Congress, Farm Security Administration/Office of War Information collection.

Gordon Parks made this photo in Washington, D.C., in the summer of 1942, for the same agency as Dorothea Lange in chapter 2. A charwoman is a woman paid to clean offices or houses. It's an old word. The woman is Ella Watson, and she cleaned a government building in Washington. Parks later wrote that he had met racism in Washington, in shops and restaurants, and he wanted to make a photo about it.

People call it "American Gothic", after a 1930 painting by Grant Wood. In the painting, a farmer with a pitchfork stands next to a woman in front of their farmhouse. Parks posed Ella Watson the same way.

Ella Watson stands in the middle of a tall frame and looks straight into the camera. A large US flag fills the top of the frame behind her. On the left, she holds a broom upside down, bristles up. On the right, a mop stands upside down, head up. The two sides match, and she's in the center on purpose. This chapter teaches you to move the subject away from the center, and this photo shows when to keep it there.

Composition means where things go in the frame

Composition means where you put things in the frame and what you leave out. In chapter 2, you picked one subject and got close. Now you'll decide where to put it.

The rule of thirds

Imagine two lines across the frame and two lines down. They divide the frame into nine equal parts, three by three.

The rule of thirds says to put the subject on one of these lines, or on one of the four points where two lines cross. Don't put it in the dead center out of habit. A subject in the exact middle often looks still and fixed, like a target. Off center, the picture has room around the subject, and your eye moves between the subject and that space.

For a person, put the eyes on or near the top line. If the subject looks or moves to one side, put it on the opposite line. Then it has space to look or move into. A face that looks out of the frame from right at the edge feels squeezed (more on space in chapter 5).

The English painter and engraver John Thomas Smith first wrote down the name "rule of thirds" in 1797. It was in his book about painting country scenes, *Remarks on Rural Scenery*. So it started as advice for painters. It's a guide, and photographers break it on purpose. The opening photo breaks it.

Keep the horizon level

The horizon is where the land or the sea meets the sky. You'll see it at the sea, a field, a lake or a long street.

If the horizon tilts a little, it looks like a mistake. The sea looks like it's running out of one side of the picture. So keep it level. If you want a tilt, tilt it a lot, so people can see you meant it (angles are in chapter 6).

Where to put the horizon

A horizon across the middle splits the picture into two equal halves, and neither half wins. So ask yourself which part is the best part.

- **If the sky is the best part,** like big clouds or a sunset, put the horizon on the lower line. The sky then gets two thirds.
- **If the ground or water is the best part,** like a field of flowers, a beach or a road, use the upper line.

The middle is right for a reflection in still water, where the top half and the bottom half match. That's symmetry again.



PHOTO Masnun, lake-chrome.jpg, a lake with the tree line across the middle and its reflection below

This is one of my photos, in Chobial's Chrome film. Trees and a white wall run across the middle, and the still water below repeats them.

When the center is better

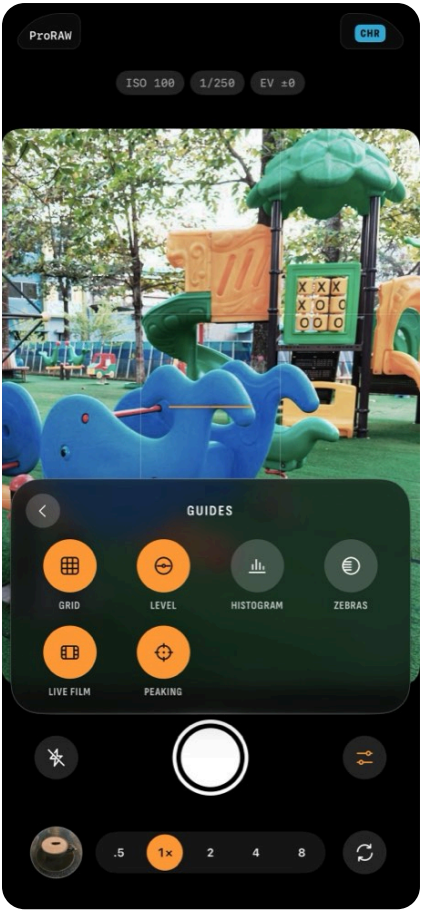
Symmetry means the left and right halves of a picture match, like a mirror. Try it with the front of a building, a door, a bridge, a road going straight away from you or a reflection. Put the middle of the scene between the two upright grid lines, so both sides match. A face looking straight into the camera also works in the center, like Ella Watson's.

When symmetry is almost right, it looks like a mistake. So step left or right until both sides match. A crooked frame also shows at once in a symmetrical photo. Walls and door frames should run in the same direction as the upright

grid lines.

In Chobial

1. Tap **Controls**, the round button with sliders, to the right of the shutter. You can also swipe up on the camera.
2. Tap **Guides**. It's a tile in the Controls panel.
3. Tap **Grid**. The tile turns orange, and two thin white lines run across the viewfinder and two run down.
4. Tap **Level**. Its tile turns orange too.



SCREENSHOT the Guides panel in Controls, with the Grid and Level tiles on and orange

The grid lines only show on the screen. They aren't saved in the photo. If you pick another frame shape, like a square (chapter 5), the grid divides that shape into thirds. **Grid** and **Level** stay on until you turn them off, even the next time you open the app.

Level draws a short line across the middle of the picture, with a gap in its center. Two short fixed marks on either side show true level. The line tilts as you tilt the phone. When the phone is off level, a small number under the line shows how many degrees it's tilted. When the phone is straight (within 1

degree), the gap closes, the fixed marks disappear and the line turns orange. The phone also gives a light click that you can feel, so you can watch the subject while you straighten.



SCREENSHOT the viewfinder with the grid on and the level line straight and orange

The level works with the phone upright or sideways. If you point the phone straight down at a plate, or straight up, the level fades. That's because there's no side-to-side tilt to measure. Tilting the phone up at a tall building makes its sides lean in, and the level doesn't measure that (chapters 6 and 44).

The other Guides tiles come later: **Histogram** and **Zebras** in chapter 13, **Peaking** in chapter 14 and **Live Film** in chapter 23.

> **On Android: Grid** and **Level** are in the same place, under **Controls**, then **Guides**. The level is one straight line with no gap, and it has no degree number and no click. It still turns orange when the phone is level.

See it

Shoot the same open view twice, like a beach, a lake or a field. The two photos below are two different seas, shot by other photographers. I turned the left one a little to show a tilted horizon.



PHOTO PAIR A sea with the horizon near the middle, tilted a little (horizon-tilted.jpg). Photo: Kyle Brooks, Unsplash, Unsplash License, turned 4° for this example. / A sea with a straight horizon low in the frame and big clouds above (horizon-low.jpg). Photo: César Couto, Unsplash, Unsplash License.

On the left, the horizon cuts the picture almost in half, and one end sits higher than the other. The water looks like it's sliding out of the frame, and the sky and sea fight for the same space.

On the right, the horizon is straight and sits near the lower grid line. The big clouds are the best part, and they get about two thirds of the picture.

Common mistake

It's easy to take a photo with a horizon that's a little crooked. To spot it, look at the horizon against the top or bottom edge of the frame, or against a grid line. If the gap is wider at one end, it's tilted.

To fix it, turn on **Level** and wait for the orange line (and the click, on iPhone). Already took the photo? Straighten it in the editor's **Crop** (chapter 26). Straightening cuts a little off the edges.

Try it

Shoot the same horizon three ways.

1. Find a horizon, like the sea, a lake, a field, a long flat roof line or a street.
2. Turn on **Grid** and **Level** (**Controls**, then **Guides**).
3. From the same spot, take three photos: the horizon on the top line, in the middle, then on the bottom line. Wait for the level to turn orange each time.
4. Tap your latest photo, bottom left, and swipe sideways between the three.
5. Decide which part was the best part, the sky or the ground. Pick the photo that gives it the most room.

For extra practice, find something symmetrical, like a door, a bridge or a building. Center it between the two upright grid lines.

4. Composition, part two: leading the eye



PHOTO Dorothea Lange, *Power farming displaces tenants from the land in the western dry cotton area. Childress County, Texas Panhandle* ("Tractored Out"), 1938. Library of Congress, Farm Security Administration/Office of War Information collection.

You met Dorothea Lange in chapter 2. She took this photo in June 1938 in the Texas Panhandle, the northern part of Texas. Museums such as the Museum of Modern Art in New York call it "Tractored Out". "Power farming" means farming with tractors and machines. Tenants were families who farmed someone else's land and paid rent. Machines could farm big fields with fewer people, so many tenant families lost their place on the land.

A plowed field fills more than half of the wide frame. A furrow is a long line that a plow cuts in the soil. The furrows start big at the bottom edge and curve across the field toward a small wooden house. The house stands alone on the flat horizon, a little right of center. There are no people and no trees, and the sky is pale and empty. The house looks empty, and the title tells you why.

Notice what your eye does. It lands on the furrows at the bottom, follows them and arrives at the house. The lines do the pointing.

Leading lines carry the eye to the subject

Leading lines are lines in the scene that carry the eye toward the subject. Look for roads, rails, fences, rivers, paths, walls, shadows or a row of lamps.

The eye follows a line. If the line ends at the subject, the eye ends there too. A line that starts near the bottom edge or a bottom corner pulls the viewer into the picture. A line that runs out of the side of the frame takes the eye out with it. Curved lines, like Lange's furrows or a winding river, lead the eye more slowly than straight ones.

Two parallel lines, like rails, seem to get closer as they go away. The vanishing point is where they seem to meet in the distance. Stand in the middle of a straight road or pier, and both sides meet at one point. Put your subject at that point or near it.

Diagonals add movement

A diagonal is a line that runs at a slant across the frame. A level line feels calm, like a horizon. An upright line feels steady, like a tree. A diagonal feels like movement, and one from corner to corner crosses the whole picture.

Look for stairs, a slanted roof, a fallen tree, a long shadow late in the day or light through blinds. You can also make a diagonal with your feet. Stand at an angle to a fence instead of straight in front of it, and its line slants across

your frame. Don't tilt the phone instead. As chapter 3 said, a horizon that tilts a little looks like a mistake.

A frame within a frame

A frame within a frame is something in the scene that makes a border around the subject. Shoot through a doorway, a window, an arch, a gap between buildings or hanging branches. The border points the eye inward and hides clutter at the edges. It's often darker than the view behind it, which sends the eye to the bright part (light comes in chapters 7 and 8).

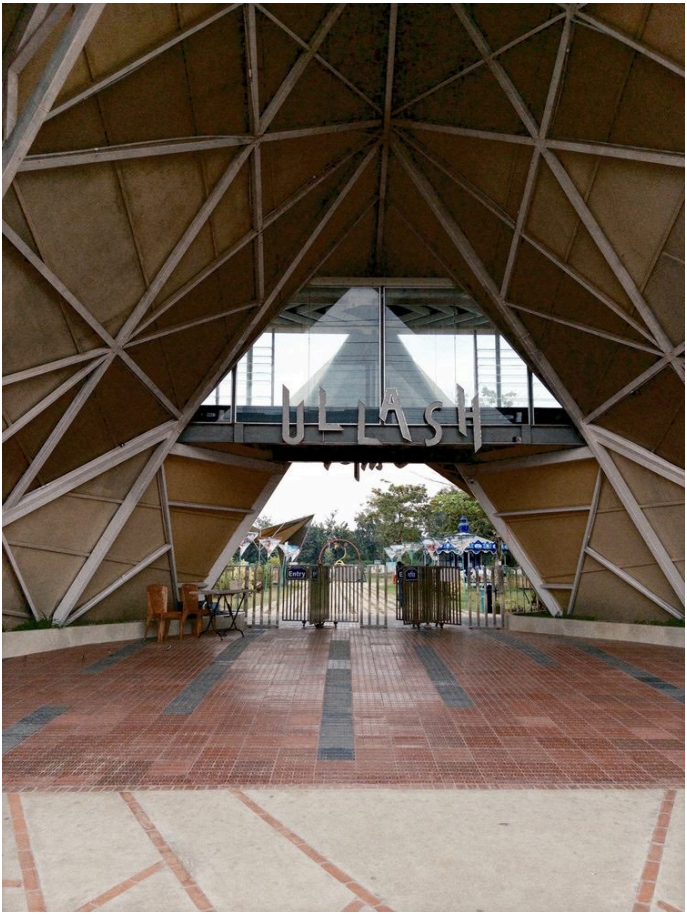


PHOTO Masnun, pavilion-nostalgia.jpg, slanted roof beams around a triangle opening onto a park

This is one of my photos, in Chobial's Nostalgia film. The triangle opening in the roof frames the park, and the beams make lots of diagonals. Dark stripes in the brick floor lead toward the entry gate, so it has leading lines too.

Foreground gives the eye a place to start

The foreground is the part of the scene closest to the camera. The background is the part farthest away, and the middle ground is in between.

Put something close at the bottom of the frame, like rocks, flowers, a puddle or the lines of a path. It gives the eye a place to start and shows how deep the scene is. A big empty foreground, like plain grass, does nothing. Fill it, or step closer to something in it.

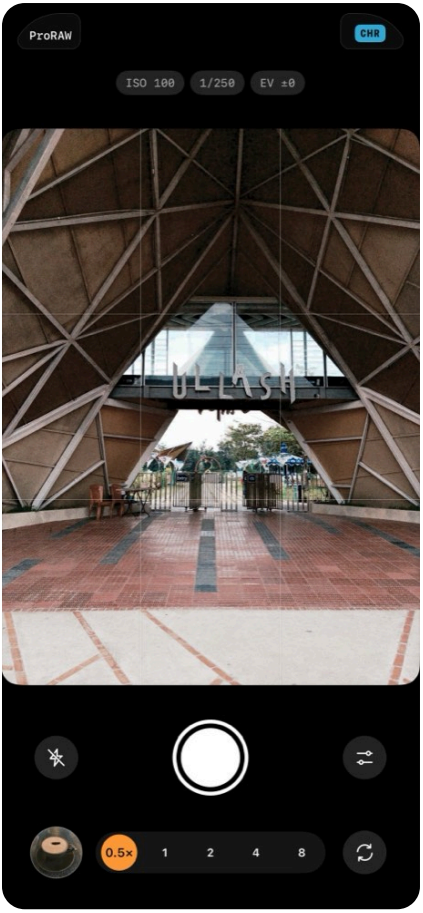
Layers make a photo look deep

A photo has layers when the foreground, middle ground and background each have something in them. A photo with all three looks deep. A flat photo has everything at the same distance. Layers can be people too: a person in front, a street behind and buildings at the back (more in chapter 38).

Lines and layers often work together. In Lange's photo, the furrows are the foreground and the leading lines at once.

In Chobial

1. Tap **Controls** (the round button with sliders, right of the shutter), or swipe up on the camera.
2. Tap **Guides**, then **Grid**. The tile turns orange.
3. Check where your line starts and ends against the corners of the frame and the grid crossing points. Let it start near a bottom corner and end at a subject on a crossing point.
4. Put a vanishing point on a crossing point, or in the middle for a symmetrical road or pier.
5. For a strong foreground, tap **.5** in the lens pill, if your phone has an ultra-wide lens. The lens pill is at the bottom of the camera screen, in the middle.



SCREENSHOT the grid on and 0.5× selected in the lens pill

The ultra-wide lens is the 0.5× lens. It fits much more of the scene. So you can stand close to flowers and still fit the background. Close things look big and far things look small, so lines that run away from you look long. Hold the phone low, a hand's length to a step from the thing in front.

The lens in use shows in a filled orange circle, like "0.5×". On iPhone, you also feel a light tap when you switch. Keep the phone level so tall things at the edges don't lean (chapters 6 and 44). Don't put a person near the edge of a 0.5× photo, because faces there look stretched (chapter 17).

> **On Android:** The lens pill lists your phone's own lenses, so the ultra-wide may show as 0.6×. It also has a **Front** choice for the front camera.

See it

Find a path that leads to a subject, like a bench or a tree. Shoot it twice: once from the side of the path, and once standing in the path, bent down at its start, with 0.5×.

The two photos below are two different parks, shot by other photographers. They show what each way does.



PHOTO PAIR A path that curves past a bench and out of the side of the frame (path-across.jpg). Photo: Ryan Spaulding, Unsplash, Unsplash License. / A grassy path that starts wide at the bottom and narrows toward a bench far away (path-to-bench.jpg). Photo: Nash Bowman, Unsplash, Unsplash License.

On the left, the photographer stood to one side. The path runs across the picture and leaves through the side, and your eye leaves with it.

On the right, the photographer stood in the path. The path starts big at the bottom and narrows toward the bench. Your eye enters at the bottom and stops at the bench, the same trip it takes in Lange's field.

Common mistake

The line leads nowhere. A beautiful road runs to an empty horizon, or out of the side of the frame, and nothing is at its end.

To spot it, follow the line with your finger on the screen. If your finger stops on empty ground or at the edge, the line leads nowhere. To fix it, put something at the end. Wait for a person to walk into it, or move until the line ends at the tree, the house or the boat.

A smaller trap is a 0.5× photo where the foreground is just plain ground. Get lower and closer to something with shape or texture, like stones or leaves.

Try it

Find a road, rail, fence or path, and make it lead to a subject.

1. Turn on **Grid** (**Controls**, then **Guides**, then **Grid**).
2. Find a line and a subject at its end, or wait for one.
3. Take photo 1 from where you first stood.
4. Take photo 2. Move until the line starts at the bottom edge or a bottom corner and ends at the subject on a grid crossing point.
5. Take photo 3. Tap **.5** in the lens pill if your phone has it, and get low and close to the start of the line.
6. Tap your latest photo, bottom left, and swipe between the three. Follow each line with your finger, and pick the photo where your finger ends on the subject.

Stay safe. Don't stand on train tracks or in a road with traffic. Shoot rails from a platform or a safe crossing, and a road from the sidewalk or a quiet path.

5. Composition, part three: space and balance



PHOTO Arthur Rothstein, *Farmer and sons walking in the face of a dust storm. Cimarron County, Oklahoma*, 1936. Library of Congress, Farm Security Administration/Office of War Information collection.

Arthur Rothstein took this photo in April 1936, when he was 20. He worked for the same US government agency as Dorothea Lange (chapters 2 and 4). Cimarron County is in the Oklahoma Panhandle, the narrow strip at the west of Oklahoma. The Dust Bowl was the time of drought and huge dust storms on the southern Great Plains of the US in the 1930s. Strong winds blew the dry soil off the farms. "In the face of" here means walking into the storm.

A farmer in a hat and his older son walk left, toward a low wooden shed. The shed is half buried in dust. The smallest boy follows on the right, one hand up to his face against the wind. Only the tops of the fence posts stick out of the dust.

Everything sits in a narrow band a little below the middle of the almost square frame. Above it, nearly half the frame is gray, dusty sky. Below it is bare, flat dust. A tight crop on the three people would show three people walking. The empty space around them shows the storm.

Negative space makes the subject stand out

Negative space is the empty part of the frame around the subject. It can be plain sky, a wall, still water, fog, snow, bare ground or a dark shadow.

Nothing in that space competes with the subject, so the subject stands out. Negative space can make a photo feel calm, lonely or quiet. It can also show how small the subject is next to something big, like a person under a big sky.

Chapter 2 said "fill the frame". Negative space is the other choice, and both work. What doesn't work is a small subject in a busy scene. The space has to be plain.

To find it, crouch to put a person against the sky, or step back and leave the sky above them. Put the small subject off center, on a third (chapter 3) or near a corner, with the space on the other side.

Give the subject room to look or move into

I promised this in chapter 3. If a person, an animal or a car faces one side, leave the empty space on that side. The eye follows where the subject looks or goes.

If the subject is at the edge, facing out, the photo feels cramped, or like they're leaving. You can do that on purpose, to show someone walking away. Then make it clear and put them right at the edge.

Visual weight: what pulls the eye

Visual weight is how strongly something in the photo pulls the eye. These things have more of it:

- **Size:** big things pull more than small things.
- **Contrast:** a bright thing on a dark background, or a dark thing on a bright one.
- **Color:** strong, warm colors like red and orange pull more than gray or pale ones.
- **Sharpness:** sharp things pull more than blurry things.
- **People:** faces pull more than objects, and eyes most of all.
- **Writing:** people read any words they see, so a sign pulls the eye.
- **Being alone:** one thing in empty space pulls more than the same thing in a crowd.

So a small, bright or red thing can weigh as much as a big dull one.



PHOTO Masnun, grass-plume.jpg, a bright plume of tall grass on the left against dark trees

In this photo of mine, the sunlit grass is bright against dark trees, so it grabs the eye. The dark trees on the right are calm, empty space.

Balance: a photo that doesn't tip

Balance is when the visual weight on both sides of the frame feels even. Then the picture doesn't feel like it's tipping to one side.

Think of a seesaw. Two children of the same weight balance at the same distance from the middle. A heavy grown-up balances a small child by sitting closer to the middle. Symmetry (chapter 3) is balance with two matching sides. Two sides that don't match can balance too. Put a big shape near the center and a smaller one farther out on the other side. Or put a big dull shape on one side and a small bright one on the other.

In Rothstein's photo, the dark shed on the left is the heaviest shape. The three people and the fence posts in the center and on the right balance it.

To check, ask if the photo on the screen feels like it's tipping. If one side is empty, move so something lands there, or put the heavy thing nearer the middle. An unbalanced photo feels uneasy or tense, and sometimes that's what you want.

The golden ratio sits just inside the thirds

The golden ratio is a number, about 1.618. People have used it in art and building for a long time.

Golden ratio lines sit about 38% and 62% of the way across the frame, and the same up and down. Thirds lines sit at about 33% and 67%. So the golden ratio lines are a little closer to the middle. Aim just inside the grid's crossing points, and you're close. Chobial's grid shows thirds only.

People argue about whether the golden ratio is special. Both rules put the subject in almost the same place, a little off center.

The rule of odds: three often beats two

The rule of odds is an old guideline. It says an odd number of things, like three or five, often looks better than two or four.

With two things, the eye goes back and forth, and they compete. With three, one sits between the other two, so the eye has a path. In Rothstein's photo, your eye goes from the farmer to the older boy to the small boy behind. The

things can differ, like one tall tree and two small ones.

When to break these rules

These are guides, like the rule of thirds. Break one when breaking it says what you want. A subject dead center in lots of empty space looks calm and still. An unbalanced photo feels tense. A couple or two friends can be the subject. If you can't say why you broke a rule, it was probably a mistake.

In Chobial

Two frame shapes are good practice here: **1:1**, a square, and **65:24**, the very wide XPan shape from chapter 2.

1. Tap **Controls**, the round button with sliders, to the right of the shutter. You can also swipe up on the camera.
2. Tap **Frame**. Each tap goes to the next shape: **4:3**, **3:2**, **1:1**, **16:9**, **65:24**, then back to **4:3**.
3. When the shape isn't 4:3, it also shows in the exposure line, like "1:1". Tap it there to go to the next shape.
4. Chobial darkens the part outside the frame but doesn't black it out, so you can still see what's just outside.
5. For **65:24**, hold the phone sideways for a wide strip, or upright for a tall one.
6. If you like, turn on **Grid**: tap **Controls**, then **Guides**, then **Grid**.



SCREENSHOT the camera in 1:1, with the area outside the square darkened and "1:1" in the exposure line

The grid follows the frame. It divides the shape you picked into thirds, so in **1:1** you get thirds of the square, and in **65:24** thirds of the strip.

A square has no long side, so the eye doesn't travel one way across it. A subject in the center looks calm, and a small subject off center with plain space around it works well. The **65:24** strip leaves lots of room on both sides of the subject. Use it for one person on a long beach, or to balance two things, one at each end.

Chobial always saves the whole sensor and keeps the shape as a crop, so you can change it later in the editor (chapter 2). The shape stays set, even the next time you open the app.

See it

Take one person on a beach two ways.

For the first photo, use **4:3** and walk close. The person fills the middle, with bits of a busy background at the edges. For the second, use **65:24** held sideways and step back. Put the person small on the left grid line, walking to the right, with plain sand and sky around them.

The first photo shows a person. The second one also shows how big and empty the place is, and the space in front gives them somewhere to go.

The two photos below show two different people on two different beaches, shot by other photographers.



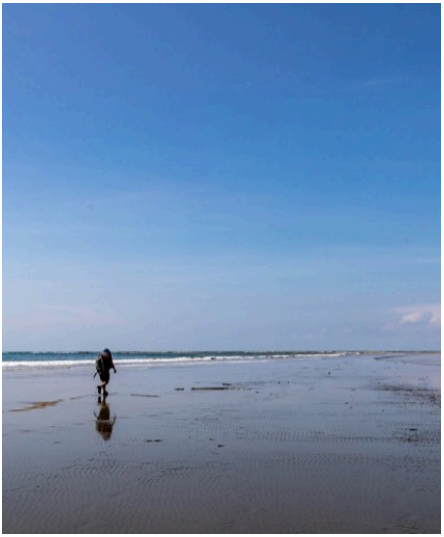


PHOTO PAIR A man close up in the middle of the frame, with a busy, crowded beach behind him (beach-close.jpg). Photo: Harsh Aryan, Unsplash, Unsplash License. / One small person on a wide, empty beach, with plain sand and sky around them (beach-wide.jpg). Photo: Bernd Dittrich, Unsplash, Unsplash License.

Common mistake

You leave lots of room around the subject, but the empty part has a car, a sign, other people or a bright patch in it. Those things have visual weight, so they pull the eye away.

To spot it, cover the subject with your thumb on the screen. If your eye lands on something else, the space isn't plain. Move a step, crouch to put the sky behind the subject, or wait until the space is clear.

Try it

1. Find one small subject with plain space around it, like a bird on a wire or a cup on an empty table.
2. Set **Frame** to **1:1**. Take a photo with the subject small and off center.

3. Set **Frame** to **65:24** and hold the phone sideways. Put the subject near one end, with the space on the side it faces.
4. If you want a third photo, add a second and third thing, or put the subject in the center.
5. Tap your latest photo at the bottom left and swipe between them. Ask which one feels balanced, and which one shows the space best.
6. Set **Frame** back to **4:3**, because the shape stays set until you change it.

6. Composition, part four: viewpoint, pattern and moment

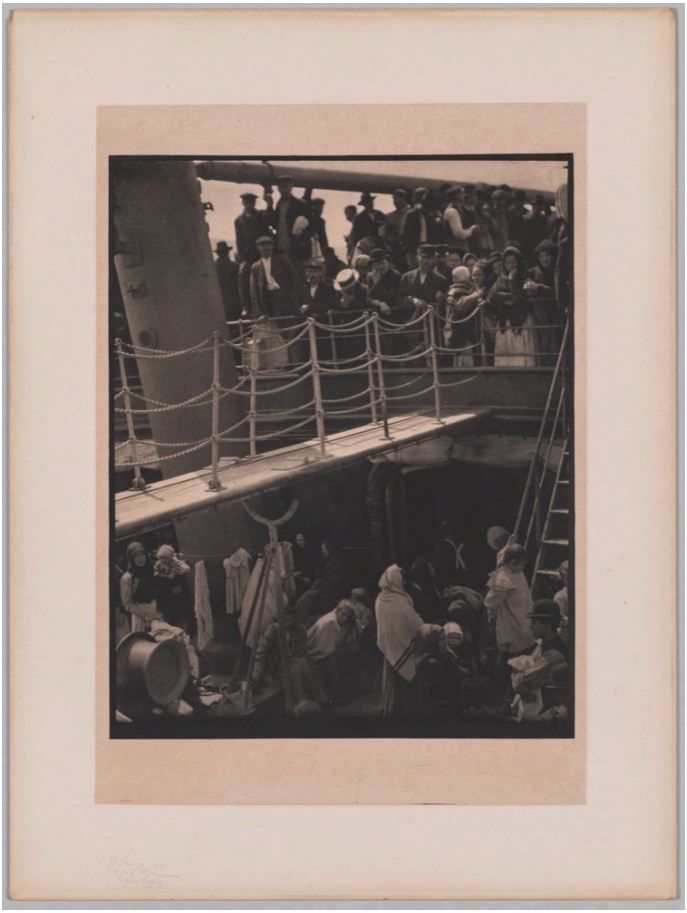


PHOTO Alfred Stieglitz, *The Steerage*, 1907. The Cleveland Museum of Art.

Alfred Stieglitz (1864–1946) was an American photographer. He worked to have photography accepted as art. He took *The Steerage* in 1907, and his magazine, *Camera Work*, first printed it in 1911. The steerage was the

cheapest part of a passenger ship, for the poorest passengers. The museum describes the people as poor immigrants going back from New York to Europe.

Stieglitz looks down on two decks crowded with people. On the upper deck, men in dark coats and hats lean on railings made of chains. One man near the middle wears a white straw hat, the only bright round hat among the dark ones. A white gangway cuts across the middle of the frame at a slant. A gangway is a narrow walkway between two decks. Below it, women in shawls sit and stand with children, and washing hangs to dry. A thick round mast fills the upper left.

He shot from high up, so the rows of hats and the loops of chain make patterns. The straw hat breaks the pattern, and your eye goes straight to it. The gangway's diagonal splits the frame in two. In 1942, Stieglitz wrote that he saw shapes that fit together, ran to get his camera, and worried the scene would change before he was back.

Viewpoint is where you put the camera

Viewpoint is where the camera is: how high, how low, how near, and from which side. Moving your feet changes the photo more than any setting does.

Eye level is the camera at the height of your eyes, standing. People see the world from there every day, so the photo looks normal. But it's also the photo everyone else takes.

A low viewpoint makes the subject look bigger, taller and stronger. Crouch, kneel, or put the phone near the ground and look up. It can also put the subject against the sky, which is a plain background (chapter 2).

A high viewpoint makes the subject look smaller. Stand on a step, a wall or a bridge, or hold the phone up high and look down. You see how things are laid out, and patterns show up, like in *The Steerage*. Straight down at a table or the ground, the scene flattens into shapes.

For a person, a child or a pet, put the camera at their eye level, so the photo feels like you're with them (chapter 42).

Why tall buildings lean, and a tilt on purpose

I promised this in chapters 3 and 4. Tilt the phone up at a tall building, and its upright sides lean in toward the top. Tilt it down, and they lean out.

To keep upright lines straight, hold the phone upright, without tilting it up or back. Then step back, or climb to about halfway up the building. Crop later if you need to. Or lean the lines in on purpose, a lot, so it's clearly a choice (more in chapter 44).

Chapter 3 said a horizon that tilts a little looks like a mistake. A big tilt on purpose makes the photo feel uneasy or full of movement. Tilt far enough that nobody thinks your hand slipped.

Patterns, and the one thing that breaks them

A pattern is a shape, line or color that repeats, like rows of windows, stairs, tiles or hats in a crowd.

To show a pattern, fill the frame with it, so it runs off the edges. Then it looks like it goes on forever. Shoot straight at it, or straight down on it, to keep the rows even.

A pattern alone can be dull. One thing that breaks the pattern gets all the attention. Think of one red umbrella among black ones, or the white straw hat in *The Steerage*. Put that one thing on a third (chapter 3).

Color can lead the eye

An accent color is one small patch of strong color in a calm, plain or gray scene. It pulls the eye straight to it, because of its visual weight (chapter 5).

Complementary colors are colors opposite each other on the color wheel. The color wheel is the ring of colors painters use. The pairs are red and green, blue and orange, and yellow and purple. Side by side, each color makes the other look stronger, like an orange coat against a blue sky.



PHOTO Masnun, ixora-chrome.jpg, pink ixora flowers against dark green leaves

In this photo of mine, in Chobial's Chrome film, the pink ixora flowers and the dark green leaves make each other look stronger.

Too many strong colors compete, and the eye doesn't know where to look. Fewer colors make a calmer photo.

Figure and ground: the subject has to stand apart

In art, the figure is the subject, and the ground is what's behind it. The figure has to stand apart from the ground.

A figure stands apart by brightness, by color or by sharpness. Dark against light works, and so does light against dark. A silhouette is the strongest case. A silhouette is a subject that shows only as a dark shape against something bright, like a person against a bright sky.

If both are the same brightness, the subject melts into the background. Black and white shows this best, because it leaves only brightness and shapes. Chobial's **Mono** film shows you this live.

Juxtaposition: two things side by side

Juxtaposition is putting two things side by side so the viewer compares them. Picture a "No dogs" sign with a dog under it. The joke comes from the pair.

The moment, and how to catch it

The French photographer Henri Cartier-Bresson made the phrase "the decisive moment" famous. It was the English title of his 1952 book. His idea is that the best photo comes in the split second when the action and the places of things in the frame come together. For example, a jumping person's legs make a shape, or a face turns toward the light.

You can catch it in two ways. The first is to find the background and the frame, then wait for someone to walk into it. The second is to start shooting just before the moment. By the time you see it, it's over. A burst helps here, and you pick the best frame later (chapter 30). If the subject is blurred in every frame, a burst can't fix that (chapter 9).

Working the scene

Working the scene means you take your first photo, then move: closer, lower, higher, around the subject. Try a portrait frame and a landscape frame. The first photo is rarely the best one, and extra photos cost only storage.

In Chobial

To keep the frame straight when you shoot low or high:

1. Turn on **Level** (chapter 3), so the frame doesn't tip sideways.
2. For upright lines, turn on **Grid** too. Compare a building's edges or a door frame with the grid's upright lines. If the edges lean in toward the top, you're tilting the phone up, so bring it back upright.
3. For a big tilt on purpose, watch the small number under the level's line. It shows how many degrees you've tilted.

For odd angles, use the front camera:

1. Tap **flip** at the bottom right for the front camera. Tap it again to go back.
2. The front camera looks the same way as the screen. Put the phone on the ground, screen up, and it looks straight up at trees or a building. You can still see the screen.
3. If your hand would shake the phone, tap **Controls**, then **Timer**, for a 3 or 10 second delay (chapter 18). It stays set until you change it or close the app.

The front camera's picture is mirrored, and Chobial saves it the way you saw it. So writing comes out backward. Keep signs out of these photos.

To catch the moment, **Hold the shutter** for a burst of up to five photos a second, and let go to stop. If too many photos are waiting to be developed, the burst stops by itself and shows "Burst stopped — developing what it took". You keep the photos it took.

To see shapes without color, load **Mono**, one of Chobial's black and white films. It's free.

1. Swipe across the picture until **Mono** loads. Or tap the film's badge to the right of the Dynamic Island and slide the row of films. The film in the middle loads when the row stops.
2. The viewfinder now shows the scene in black and white.

3. If it stays in color, tap **Controls**, then **Guides**, and turn on **Live Film** (orange when on).

Every photo keeps its original, so you can pick a color film later in the editor. Black and white comes in chapter 25.

> **On Android:** On a foldable phone, half open it and stand it on a table, a wall or the ground, with the fold across. The picture takes the top half and the controls the bottom half, which is handy for low shots. The level has no degree number, but it still turns orange when the phone is level.

See it

Take one flower two ways.

First, stand and shoot from eye height, looking down. The flower is small, and the busy ground is behind it. Then crouch low beside the flower and look a little up, so the flower is against the plain sky.

Crouching puts the plain sky behind the flower. Nothing behind it competes, so the flower stands apart.

The two photos below show different flowers, shot by other photographers, one from above and one from low down.



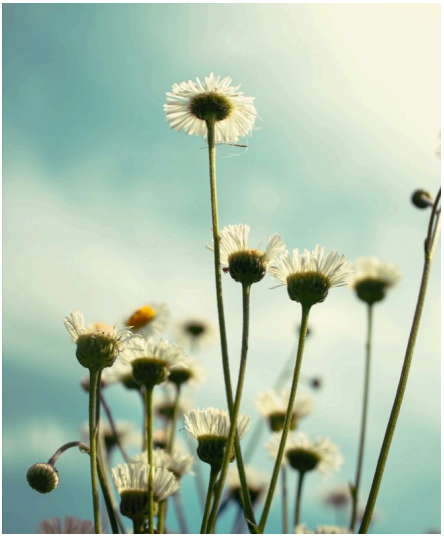


PHOTO PAIR A small purple flower seen from above, lost in busy soil and grass (flower-ground.jpg). Photo: Sebastián Brito, Unsplash, Unsplash License. / Daisies seen from low down, against a plain sky (flower-sky.jpg). Photo: Zach Jenkins, Unsplash, Unsplash License.

Common mistake

You take every photo standing up, from eye height, from the first place you stood.

To spot it, look through your last 20 photos. How many did you take from your own eye height, or from the first place you stood? The fix is to take one photo, then move before the next one. Crouch, climb, or walk around the subject.

Try it

1. Pick one subject that won't run away, like a bicycle, a tree, a chair, a statue or a cup.
2. Take ten photos, each from a different place. Try standing, crouched, with the phone near the ground, and from above. Try the left, the right and

behind, very close and far away. Take one with the front camera, the phone on the ground, screen up.

3. Turn on **Level** for the low ones, so the frame doesn't tip sideways.
4. Try one in **Mono** to see if the subject stands apart from the background.
5. Tap your latest photo at the bottom left and swipe through all ten. Pick the one you like best, and note where you took it from. Was it the first place you stood?
6. If you changed the film to **Mono**, swipe back to your usual film.

7. Light



PHOTO Clarence H. White, *By the Window*, 1896. The Cleveland Museum of Art.

Clarence H. White (1871–1925) was an American photographer who taught himself. His best work, the museum says, is simple scenes of his family and friends at home in Ohio.

In *By the Window*, a young woman in a long, pale dress leans toward a tall window on the left. One hand is raised to the glass. All the light comes from that one window. Her face, her hand and the front of her dress are bright. Her back and the room on the right fall into soft gray, with no sharp shadow lines.

One big window off to the side gives soft light from one side. The lit side and the shadow side give her face and her dress their shape.

Where the light comes from

Light direction is where the light comes from, compared with the camera. You can change it by turning the subject, or by walking a few steps around it.

Front light comes from behind you and falls straight onto the front of the subject. The shadows fall behind the subject, where the camera can't see them. Colors look bright, but the subject looks flat, with little shape or texture. People facing the sun also squint.

Side light comes from the left or right of the subject. One side is lit and the other is in shadow. That shows the subject's shape, and the texture of stone, bark, bread or skin. It's the light in *By the Window*.

Backlight comes from behind the subject, facing you. It draws a bright outline around hair, fur and leaves, and it makes leaves and thin cloth glow. The side facing you is in shadow. If the background is much brighter, the subject can turn into a silhouette (chapter 6). A backlit face often comes out too dark (chapter 8). Don't point the camera straight at the sun. Light shining straight into the lens can put streaks and haze across the photo.

Top light is the noon sun, from almost straight above. On a face, it puts dark shadows in the eye sockets and under the nose and chin.

Hard light and soft light

Hard light makes shadows with sharp edges. It comes from a light that is small compared with the subject, or far away. The sun in a clear sky, a bare bulb and a phone's flash all give hard light. The difference between bright and dark is strong. That difference is called contrast.

Soft light makes shadows with soft, blurry edges, or almost no shadows at all. It comes from a big light close to the subject. A cloudy sky, a big window with no direct sun coming in and light bounced off a white wall all give soft light. It's kind to faces.

Whether light is hard or soft depends on the size of the light compared with the subject. The sun is huge, but it's so far away that it looks small in the sky, so its light is hard. Clouds spread the sun's light across the whole sky, so the light gets soft. Move any light closer to the subject and it gets softer.



PHOTO Masnun, white-flower-negative.jpg, a white hibiscus under an awning on a cloudy day

I took this white hibiscus on a cloudy day, in Chobial's Negative film. The white petals keep their shape with soft gray shading, and there are no hard shadows.

Neither kind is better. Hard light is bold, and strong shadows can be the picture. Soft light is gentle and good for faces and quiet scenes.

The time of day changes the light

Golden hour is the time soon after sunrise and before sunset, when the sun is low. The light is warm, yellow or orange, and comes from the side. Shadows are long, and the light is softer than at noon. Chapter 1 showed why low sun looks orange. How long golden hour lasts depends on where you are and the time of year.

Blue hour is the short time before sunrise and after sunset, when the sun is below the horizon. The sky turns deep blue, and the light is very soft and dim. Lit windows and street lamps glow against the blue. It often lasts only about 20 to 40 minutes. With so little light, you need a slower shutter speed or a higher ISO (chapters 9 and 10).



PHOTO Masnun, city-dusk-saturated.jpg, a city at dusk seen from above, with trees in front

This is my photo of a city at dusk, in Chobial's Saturated film. The sky is blue, with pink clouds.

A fully cloudy day is one big soft light. But the light has little direction, so the photo can look flat and gray.

Open shade

Open shade is shade with open sky above it or in front of it. Think of the shady side of a building. The direct sun is blocked, but the bright sky still lights the subject, so the light is soft. Put the person at the edge of the shade, facing the open sky. The light there often looks a little blue (chapter 15).

Window light

Window light is the easiest good light in any home or café. A window with no direct sun coming in is a big soft light. Put the subject beside it, and you get side light, like in *By the Window*.

Window light gets weaker fast as you move away from the window, so bring the subject close.

If the shadow side is too dark, hold a sheet of white paper, a white card or a white towel on that side. The white sheet bounces some light back into the shadow. This is called a reflector.

With direct sun coming in, window light is hard. A thin white curtain softens it.

In Chobial

Metering is how the camera measures the light to choose the exposure. You can tell Chobial where to meter.

1. **Tap the picture** on the thing that matters, like a face or the lit side of a cup. The camera focuses and meters there. It sets the ISO and shutter speed for that spot.
2. A frame marks the spot, with a small sun beside it.

3. Tap a bright part, and the whole photo gets darker. Tap a dark part, and the whole photo gets brighter. Watch the ISO and shutter speed change in the exposure line under the Dynamic Island. Chapter 8 explains why.
4. Lift your finger straight off after the tap. A small slide up or down changes EV (chapter 0).
5. The tap holds until the scene changes a lot, for example when you move the phone. Then the camera goes back to measuring the whole picture. To keep focus and exposure fixed, **touch and hold** the picture (chapter 19).



SCREENSHOT the focus frame with its small sun on the lit side of a cup by a window

Now walk around the cup and tap it each time. Watch the shadows move across it. To see only light and shadow, load the free **Mono** film (chapter 6).

> **On Android:** After a tap, the camera holds that spot for about six seconds, then goes back to measuring the whole picture. Holding the picture, or holding a volume key, locks focus and exposure (chapter 19).

See it

Take one orange two ways.

First, put the window behind you, so the light falls straight onto the orange. It has almost no shadow on it and looks like a flat circle. Then move so the window is to one side of the orange. One side is lit, the other is in soft shadow, and the orange looks round. Its skin shows texture.

The two photos below are different oranges, shot by other photographers. They show the two kinds of light.



PHOTO PAIR An orange lit evenly from the front, looking flat (orange-front.jpg). Photo: Mockup Graphics, Unsplash, Unsplash License. / Oranges in a bowl lit from one side, with one side bright and one in shadow (orange-side.jpg). Photo: Jasper Gribble, Unsplash, Unsplash License.

Common mistake

You photograph a person or a building at noon, with the high sun behind you or above.

To spot it, look at the subject. There are no shadows on it, or the eye sockets are dark, or the person is squinting. To fix it, move the person into open shade, or turn so the light comes from the side. Or come back in golden hour.

Try it

1. Put one object by a window, like a cup, an orange or a loaf of bread.
2. Stand with the window behind you, and tap the object to meter on it. Take a photo. This is front light.
3. Move so the window is to one side of the object. Tap the object and take a photo. This is side light.
4. Move so the window is behind the object. Tap the object and take a photo. This is backlight.
5. Take the side-light photo again, with a sheet of white paper on the shadow side.
6. Tap your latest photo at the bottom left and swipe through all four. See where the shadows fall in each one.
7. If you like, take the four again in **Mono** (chapter 6). Then swipe back to your usual film.

8. Exposure: how bright the photo is



PHOTO Marion Post Wolcott, *Center of town. Woodstock, Vermont. "Snowy night"*, March 1940. Library of Congress, Farm Security Administration/Office of War Information collection.

It's night in a small town after heavy snow. High banks of snow line a sidewalk, with footprints in the path. A street lamp glows in the middle, with a bright halo. On the left is a white wooden house with dark shutters. Down the street, shop windows are lit and parked cars sit under the snow.

Marion Post Wolcott (1910–1990) was an American photographer. She made this photo for the Farm Security Administration (FSA). The FSA was a US government agency that hired photographers to record American life.

Look at the snow. It's white, with soft gray shading that shows every bump and footprint. The sky is black. Neither one has turned into gray. That's the exposure the photographer chose. We don't know her camera settings or how she measured the light. A camera left to judge this scene alone would try to turn both the snow and the sky toward gray. It could easily get the exposure wrong.

Why the camera wants everything to be middle gray

A camera's meter is the part that does the metering. It measures the light and picks an exposure that makes the scene come out at an average brightness. That's about halfway between black and white. Photographers call it middle gray.

The meter can't tell what the things in the scene are. It doesn't know that snow is white or that your cat is black. It only sees how much light comes back.

Most of the time, that works well. A phone's meter looks at the whole picture, and it's smarter than an old light meter. But a scene that is mostly white or mostly dark can still fool it.

- **A mostly white scene comes out too dark.** Think of snow, a white wall or a white dress. The meter sees a lot of light, so it cuts the exposure, and the snow looks gray.
- **A mostly dark scene comes out too bright.** Think of a black cat, a black coat or a dark wall. The meter sees little light, so it adds exposure, and the black looks gray.

A photo that got too much light and looks too bright is overexposed. A photo that got too little light and looks too dark is underexposed.

Why tapping a bright spot makes the photo darker

Chapter 7 showed that tapping a bright part darkens the whole photo. When you tap, the meter measures that spot and makes it come out middle gray. A bright spot gets pulled down, so the whole photo gets darker. A dark spot gets pulled up, so the whole photo gets brighter.

The same thing explains the backlit face from chapter 7. When a person stands in front of a bright sky or a window, the meter sees mostly bright background. So it makes the photo darker, and the face comes out too dark. Sometimes it's almost a silhouette.

Exposure compensation and stops

You can tell the camera to make the photo brighter or darker than the meter chose. This is called exposure compensation. Chobial shows it as EV.

EV moves in stops. A stop is one step in exposure. One stop more is twice as much light, and one stop less is half as much. So +1 EV is one stop brighter, and −1 EV is one stop darker. Phones and cameras move in thirds of a stop, so the numbers go +0.3, +0.7, +1.0, +1.3 and so on.

Some starting points to try, and then check the result on the screen:

- Snow or a white wall in bright light: about +1 EV, sometimes up to +2.
- A black cat or a dark scene: about −1 EV.
- A scene that's half bright and half dark: leave EV at ±0.

In Chobial

1. **Tap the picture** where you want the camera to measure. The camera focuses and meters on that spot. A frame marks the spot, with a small yellow sun beside it on a short vertical line.
2. **While the sun shows**, drag up on the picture to make the photo brighter, or down to make it darker. The sun moves along its line, and the number

beside it shows the EV, like +0.7.

3. Each small click you feel is a third of a stop. You feel a firmer click at ±0. A short thumb slide is about one stop.
4. Look at **EV** in the **exposure line**, under the Dynamic Island. It reads ±0 at the camera's own choice and turns orange when you change it.



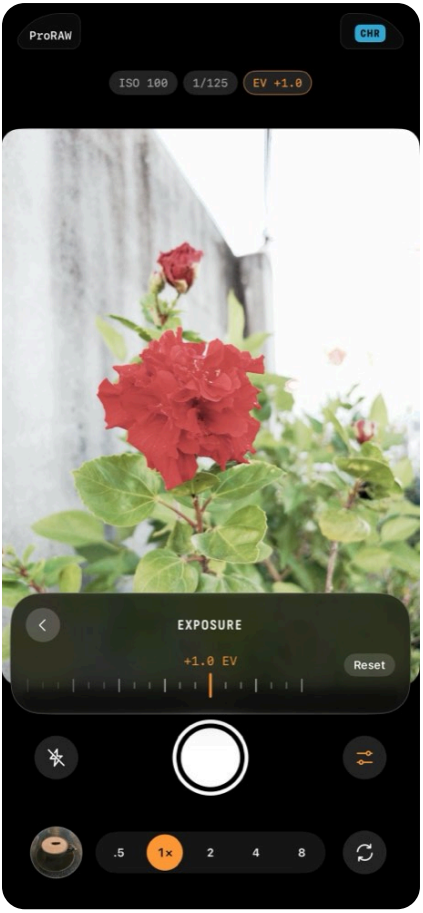
SCREENSHOT a tap on a white wall, the yellow sun at +1.0 and EV in orange in the exposure line

The sun goes away about 2.5 seconds after you stop. After that, a swipe up on the picture opens **Controls** instead of changing EV.

Each new tap on the picture puts EV back to ±0. A tap is a fresh look at the scene, so it starts from the meter's own answer. So tap first, then drag. (Touch and hold does the same, chapter 19.)

EV stays where you set it, photo after photo. It changes back when you tap **Reset** or tap the picture again (chapter 0 showed how to reset it).

If you'd like a dial, tap the **EV** value in the exposure line. You can also open **Controls** and tap the **Exposure** tile. A dial appears across the bottom of the picture, labeled like "+1.0 EV". Slide it sideways. Each tick is a third of a stop, and **Reset** on the dial puts it back to ±0.



SCREENSHOT the Exposure dial reading +1.0 EV, with Reset

You can go up to 3 stops brighter or darker, from −3.0 to +3.0. EV also works when you set ISO or the shutter speed yourself. Then EV changes the one you left to the camera (chapter 12).

Chobial shoots RAW by default, so a photo that came out too dark or too bright can often be fixed in the editor later (chapter 26). But a part that has turned pure white has lost its detail (chapter 13).

> **On Android:** The EV range comes from the phone. It's up to 3 stops either way, and some phones allow less.

See it

Find a white subject that fills most of the frame, like a white wall with a plant in front. A white cup on a white tablecloth works too.

Take one photo at EV ±0. The white will look dull and gray, because the meter pulled it toward middle gray. Then take the same photo at +1.0 EV. Now the white looks white again. Open the two photos one after the other and compare the white.

Common mistake

You take a photo of a friend with the bright sky behind them and leave it to the meter. The meter sees all that sky and darkens the photo.

To spot it, look at the face. The sky looks good, but the face is dark, close to a silhouette.

To fix it, tap the face. Now the meter measures the face. If it's still dark, drag up. The sky behind will go white with no detail. That's the trade, and usually the face is the part that matters.

You can also move so the sun isn't behind your friend (chapter 7). Flash (chapter 16) or brightening only the face later (chapter 27) are two more ways.

Try it

You'll take six photos: a white wall and a dark wall, each at ±0, +1 and –1 EV.

1. Find a white wall and fill the frame with it.
2. Tap the wall. EV is now ±0. Take a photo.

3. Drag up until the number beside the sun reads +1.0. That's three clicks. Take a photo.
4. Drag down until it reads −1.0. Take a photo. If the sun has gone away, tap the EV value in the exposure line and use the dial. Tapping the picture again would put EV back to ±0.
5. Do the same with a dark wall. A dark door or a dark sofa works too.
6. When you're done, tap **EV** in the exposure line and tap **Reset**.
7. Tap your latest photo, bottom left, and compare the six photos. Which white wall looks white? Which dark wall looks dark?

You should find that both walls look gray at ±0. The white wall looks right near +1, and the dark wall looks right near −1.

9. Shutter speed

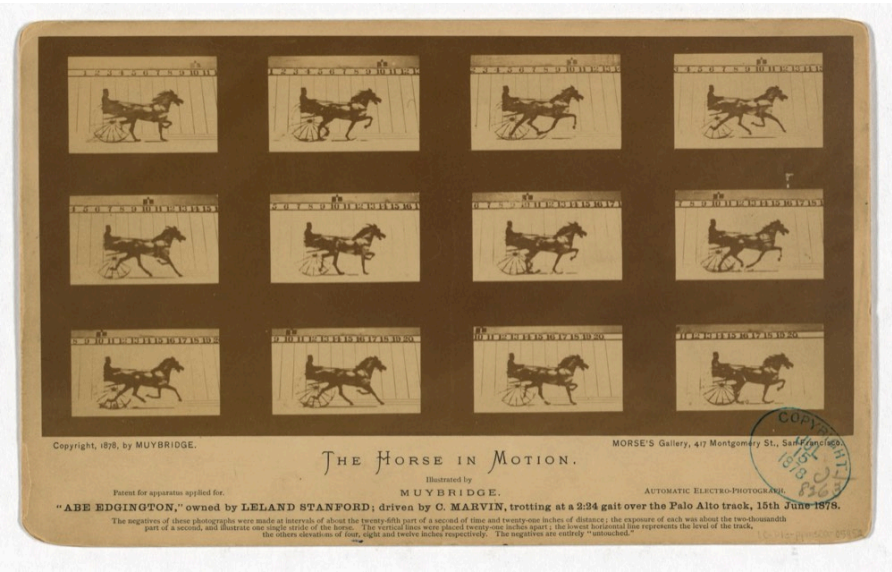


PHOTO Eadweard Muybridge, *The Horse in Motion. "Abe Edgington," owned by Leland Stanford; driven by C. Marvin, trotting at a 2:24 gait over the Palo Alto track, 15th June 1878*, 1878. Library of Congress, Prints and Photographs Division.

This card has twelve small photos in a grid. Each one shows the horse Abe Edgington, trotting on the Palo Alto track in California on 15 June 1878. He's pulling a sulky. A sulky is a light cart with two wheels for one driver.

Eadweard Muybridge (1830–1904) took these photos. He was born in England and worked in California. The horse's owner, Leland Stanford, was a former governor of California. Stanford wanted to know if a horse ever has all four feet off the ground at once. Your eye can't tell, because the legs move too fast.

Muybridge set up a row of 12 cameras along the track, with wires across it. When the sulky's wheel passed over a wire, it closed an electric circuit and fired one camera. So the twelve photos show twelve moments of one stride.

Each shutter time was about a thousandth of a second, by the claims of the time. That froze the legs sharply enough to show positions the eye can't see. A few days later, on 19 June 1878, his photos of a galloping horse called Sallie Gardner showed all four feet off the ground.

That's the idea of this chapter. A very short shutter time freezes fast movement.

How shutter speed is written

Shutter speed is written as a fraction of a second. 1/1000 s is one thousandth of a second. 1/30 s is about thirty times longer. Times of 0.3 s or longer show in seconds, like 0.5".

People call a short time a "fast" shutter and a long time a "slow" shutter. So fast means short, and slow means long.

Shutter time does two things. It sets how much light gets in. Double the time lets in double the light, which is one stop more. It also sets how movement looks.

Freezing movement or letting it blur

If something moves while the shutter is open, it smears in the photo. This is called motion blur.

A short enough shutter time makes a moving thing look sharp and still. This is called freezing the motion. Some rough starting points:

- People walking: about 1/250 s.
- Running children, dogs, sports and cyclists: about 1/500 to 1/1000 s.
- Water drops in the air and splashes: 1/1000 s or faster.

Speed, distance and direction all change these numbers. Something moving across the frame blurs more than something coming toward you. Something close blurs more than the same thing far away.

Sometimes you want the blur. A long time turns moving water soft and makes a passing car a streak. Try 1/30 s or slower. Flowing water gets silky around 1/4 s and slower, but then the phone must rest on something, like a wall or a table. Things that don't move stay sharp, as long as the phone stays still.

Look at the list you made in chapter 1. Which of those scenes had a time fast enough to freeze a running dog?

Camera shake and motion blur

Camera shake is blur over the whole photo. It happens when your hands move the phone while the shutter is open.

On a phone, most people can hand-hold about 1/30 s if they're careful. Slower than that, rest the phone on something. Many phones have stabilization in the main camera. The lens or the sensor moves to cancel small hand movements. Stabilization helps at slower times, but it can't stop a moving subject from blurring.

To tell the two blurs apart, look at the parts that weren't moving. Camera shake blurs everything, including them. Motion blur blurs only the moving thing, and the still parts stay sharp. Holding the phone still is chapter 18.

Panning

Panning means moving the phone along with a moving subject while you take the photo. The subject stays fairly sharp, and the background smears into streaks.

Follow the subject smoothly, and keep moving while you press and after. Start around 1/30 s for a passing car or bike. Expect a lot of misses, so take a burst.

What a fast shutter costs on a phone

A phone's aperture is fixed. So to keep the same brightness, the ISO has to follow the shutter. A shorter time means a higher ISO, and higher ISO means more noise (chapter 10). That's the price of a fast shutter in dim light.

Bright light lets the camera use very short times. I took these seesaws on Auto, and the phone picked 1/423 s at ISO 50.

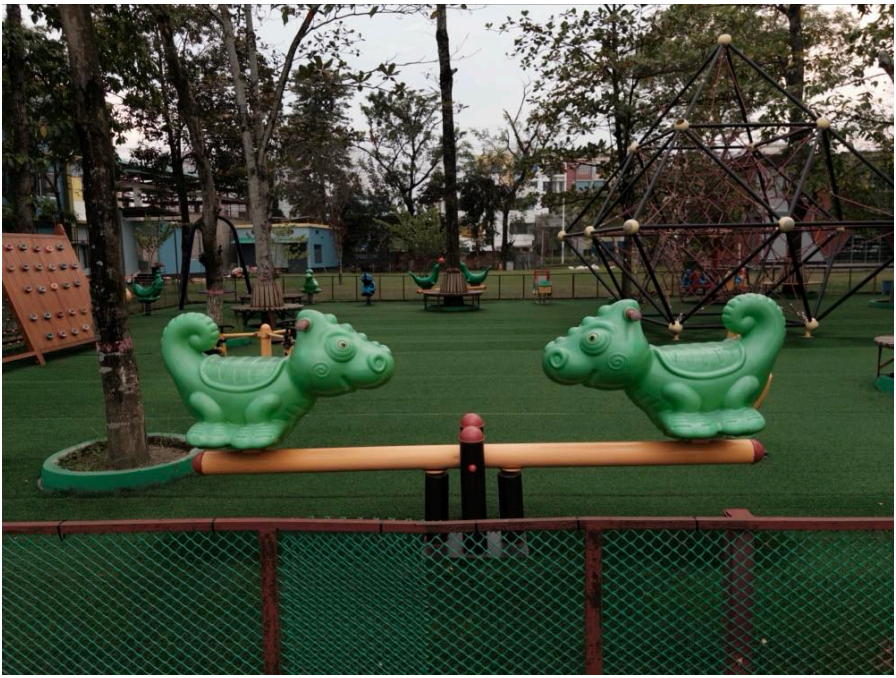
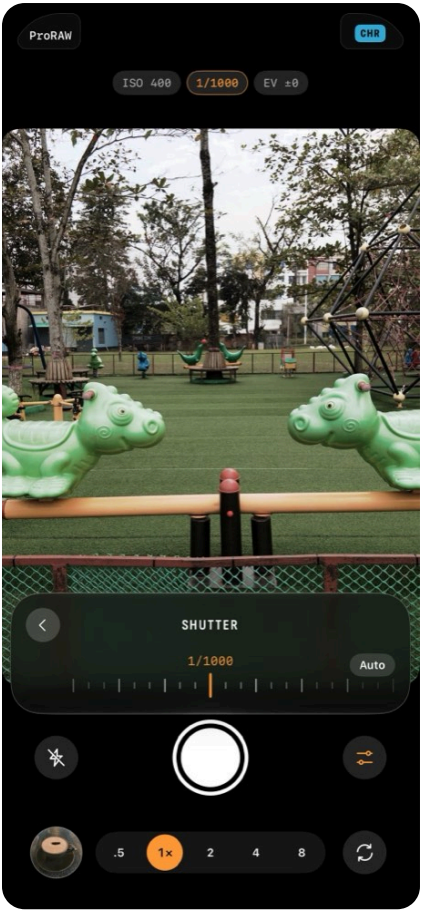


PHOTO my green seesaws in a park, iPhone Duo, 1/423 s at ISO 50, in the Chrome film (seesaw-chrome.jpg)

In Chobial

1. In the **exposure line** under the Dynamic Island, tap the shutter value, like "1/125". The camera's own values are gray. You can also tap **Controls** (the round button with sliders, right of the shutter) and then the **Shutter** tile.

2. A dial opens across the bottom of the picture. Slide it sideways. Each tick is a click you feel. The steps are a third of a stop apart: 1/125, 1/100, 1/80, 1/60 and so on.
3. The shutter value turns orange, because you set it. The camera keeps setting the ISO for you. Watch the ISO go up when you pick a shorter time.
4. To give the shutter back to the camera, tap **Auto** at the top right of the dial. **Back to Auto** in the Controls panel gives back everything you set. **‹** goes back to all the controls.
5. Tap your latest photo, bottom left, and **swipe up** on it. The camera card shows the shutter speed and ISO. A time you set by hand has an "M" after it, like "1/1000 M".



SCREENSHOT the shutter dial open across the bottom of the camera, reading 1/1000, with Auto at the top right

The dial's range comes from your phone and the lens you're using, so it isn't the same on every phone. With the shutter set, dragging on the picture (EV, chapter 8) changes the ISO. Setting both yourself is chapter 12.

If the camera can't reach the brightness the meter wants, the value it's setting turns red. Set 1/4000 s in a dim room, and the ISO can't go high enough. It turns red, and the photo comes out too dark. A long time in bright sun does the opposite.



SCREENSHOT the exposure line with the shutter in orange and the ISO in red

The time you set stays set, photo after photo, until you tap **Auto** or **Back to Auto**.

You can tap a person or a pet to follow them (chapter 14). While Chobial follows a subject and sets the exposure itself, it keeps the shutter at 1/125 s or faster. That's quick enough for most people and pets at a normal pace. In a very dark room it can give up this limit, because the photo would be too dark.

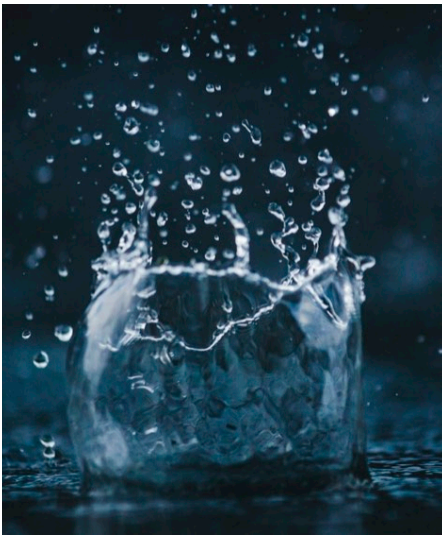
> **On Android:** The **Shutter** and **ISO** tiles show only on a lens that lets apps set them. Some phones don't allow it on every lens. Following tracks faces only, so the 1/125 s rule works for people but not for pets.

See it

Find running water, like a tap, a fountain or a stream. Rest the phone on something so it can't move.

Take one photo at 1/1000 s. The drops freeze in the air. Then take one at 1/4 s, if your dial goes that far. The water turns soft and smooth, and the things around it stay sharp.

The two photos below are different water, shot by other photographers. They show what a fast and a slow shutter do.



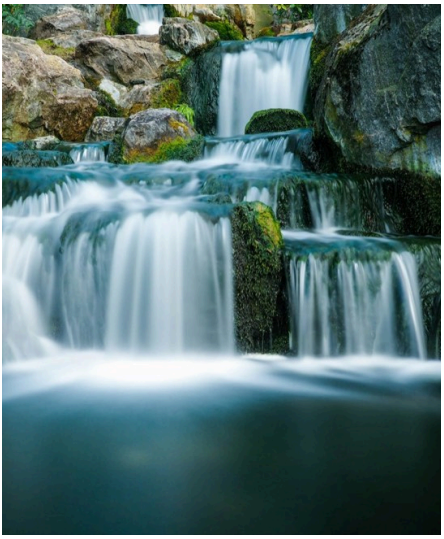


PHOTO PAIR A splash with every drop frozen in the air, from a fast shutter (splash-frozen.jpg). Photo: Amadej Tauses, Unsplash, Unsplash License. / A waterfall turned soft and smooth by a long shutter, with sharp rocks around it (waterfall-smooth.jpg). Photo: Mike Lewis HeadSmart Media, Unsplash, Unsplash License.

Common mistake

Your photo comes out blurry, and you blame the focus. Often the shutter was too slow.

To spot it, look at the parts that weren't moving. If they're blurred too, that's camera shake. If only the moving thing is blurred, that's motion blur. Then check the shutter speed on the camera card.

For motion blur, use a faster shutter. For camera shake, rest the phone or use a faster time. Chobial shoots RAW by default, so a dark photo can be brightened in the editor (chapter 26). Blur can't be fixed later.

Also watch for a slow shutter you set earlier and forgot. If the shutter value in the exposure line is orange, tap it and tap **Auto**.

Try it

You'll take three photos of running water, at 1/1000, 1/60 and 1/4 s.

1. Find running water. A tap, a fountain or a stream all work.
2. Rest the phone on a wall, a railing or a table.
3. Tap the shutter value in the exposure line. Slide the dial to 1/1000 and take a photo. Look at the ISO.
4. Slide the dial to 1/60 and take a photo.
5. Slide the dial to 1/4. If your dial doesn't go that far, use its longest time. Open **Controls** and tap **Timer** until it reads 3s, so your finger doesn't shake the phone. Take a photo.
6. In shade, the ISO may turn red at 1/1000. In sun, it may turn red at 1/4 s. The photo will be too dark or too bright. That's fine here, or you can move.
7. When you're done, tap **Auto** on the dial. Then tap **Timer** in Controls until it reads Off.
8. Tap your latest photo, bottom left, and swipe up on each of the three.

At 1/1000 s, you should see frozen drops and the highest ISO. At 1/4 s, the water should be soft and smooth, with the lowest ISO. The 1/60 s photo sits in between.

10. ISO and noise



PHOTO Jack Delano, *Night view of part of the South Water street freight terminal of the Illinois Central R.R., Chicago*, May 1943. Library of Congress, Prints and Photographs Division, FSA/OWI Collection.

Jack Delano took this photo of a Chicago freight terminal at night. Tall office buildings with lit windows stand against a black sky. Round street lamps glow along a bridge, and dark freight cars wait on the right. Across the tracks in front, thin wiggly lines of light look like handwriting. They're probably lanterns, carried by railroad workers who walked through the frame while the shutter was open.

Delano shot it on Kodachrome, a color film made by Kodak. Color film in 1943 was very slow, roughly ISO 10 on the scale we use now. Your phone starts at about ISO 25 to 64. So the shutter must have stayed open a long time. The buildings are sharp, so the camera must have stood very still, on something like a tripod.

Delano couldn't turn the ISO up. His only way to get more light was more time. So the still things came out sharp and clean, and the moving lights turned into lines. A phone in the dark usually does the opposite. It turns the ISO up, and the price is noise.

How ISO numbers work

ISO is a number for how much the camera brightens the light it gets. Each time the number doubles, the picture gets one stop brighter. So ISO 100, 200, 400, 800 and 1600 are each one stop apart. ISO 1600 is 16 times ISO 100, or 4 stops.

On real film, the ISO was the film's speed, printed on the box. People used to call it ASA. You couldn't change it in the middle of a roll. A digital camera can change it for every photo.

Where noise comes from

Light is made of tiny bits, and they don't arrive evenly. Think of light rain on paving stones. Some stones get more drops and some get fewer. Each pixel is like one stone, and it gets a slightly random amount of light.

In bright light, each pixel gets so many bits that the small differences don't show. In dim light, each pixel gets only a few, and the differences show as speckle. The sensor's electronics add a little noise of their own too.

So noise really comes from too little light. ISO doesn't make the noise, but it brightens the picture and the noise together. That's why a high-ISO photo shows it. A dark low-ISO photo that you brighten later in the editor usually has about the same noise, or more.

Noise shows most in the shadows and in flat, dark areas, like a night sky or a dark wall. It shows less in bright, busy areas. Some of it is light and dark speckle. The rest is color noise. Color noise is tiny specks of the wrong color, like red, green and blue dots.

Phone sensors and pixels are small, so each pixel gets little light. That's why phones show noise sooner than big cameras (chapter 21). On many phones, the main 1× camera gets the most light. The other lenses often need a higher ISO in the same light (chapter 17).

Your phone also smooths noise away after the shot. This is called noise reduction. A little is fine. A lot smears fine detail like hair, grass and leaves, and the photo can look like a painting (chapter 20).

Real film has grain instead. Grain is the speckled texture of film, from tiny bits in the film itself. Fast film has bigger grain than slow film. Many people find film grain nicer to look at than color noise. Black and white hides color noise, because there's no color left for the specks to have.

Grainy and sharp beats clean and blurry

Your phone has a fixed aperture. So in dim light, you choose between a slower shutter and a higher ISO. The slow shutter risks blur. The high ISO brings noise.

You can't fix blur from shake or a moving subject later. You can live with noise. A sharp, grainy photo of the moment is better than a clean, blurry one. So raise the ISO before the shutter gets too slow for your subject.



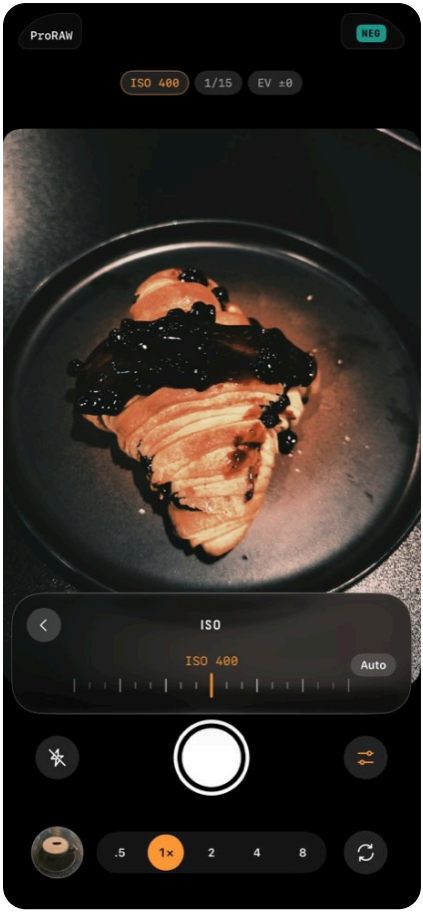
PHOTO my two foldable phones on a dark table, iPhone 17 Pro Max, 1/30 s at ISO 1600 (two-foldables.jpg)

The foldables photo from chapter 1 was ISO 1600. Indoors, my phone held the shutter at 1/30 s and raised the ISO instead.

Keep the ISO low when the phone rests on something and nothing in the scene moves, like a building at night. Then a long time at a low ISO gives the cleanest photo, just like Delano's. A high ISO in bright light doesn't help. It only makes the photo too bright, or it forces a very short time.

In Chobial

1. Look at the **exposure line** under the Dynamic Island. It shows the ISO, shutter and EV, like "ISO 64", "1/8547" and "EV ±0". Gray values are the ones the camera chooses.
2. Tap the ISO value. You can also tap **Controls** (the round button with sliders, right of the shutter button) and then the **ISO** tile.
3. A dial opens across the bottom of the picture. Slide it sideways. Each tick is a click, a third of a stop apart: 100, 125, 160, 200 and so on. The lowest and highest ISO depend on your phone and lens.
4. The ISO value turns orange, because you set it. The camera still sets the shutter. Turn the ISO up and the shutter time gets shorter. Turn it down and it gets longer. Dragging up or down on the picture (EV, chapter 8) also changes the shutter.
5. Watch for red. With ISO set, the camera won't pick a shutter slower than 1/8 s, so you can still hand-hold. If the scene needs more light, the shutter value turns red and the photo comes out too dark. Raise the ISO, or set the shutter yourself (chapter 12).
6. Tap **Auto** at the top right of the dial to give the ISO back. **Back to Auto** in the Controls panel gives back everything you set. **‹** goes back to all the controls.



SCREENSHOT the ISO dial open across the bottom of the viewfinder, with the ISO value orange in the exposure line

The ISO stays set, photo after photo, until you tap **Auto** or **Back to Auto**. You can also do it the other way round, as in chapter 9. Set the shutter, leave ISO on Auto, and the camera sets the ISO.

To check a photo later, tap your latest photo (bottom left) and **swipe up**. The camera card shows the ISO. An ISO you set by hand has an "M" after it, like "ISO 3200 M". To look at the noise, **pinch** to zoom, or **double-tap**.

Chobial's films react to ISO too. A film with grain gets grainier when you shoot above its own speed, like real film. The grain grows a little for each stop above, up to 3 stops. **Portrait** is rated ISO 400, **Gold** ISO 200, and **B&W** and its filter versions ISO 400. You see it in the viewfinder too. A film with no grain stays clean, but photos at ISO 2000 or higher get a little grain. To change it, open the photo, tap **Edit**, and slide **Grain** in the **Film** tool (chapter 23).

> **On Android:** The **ISO** and **Shutter** tiles only show on a lens that lets apps set them. Some phones don't allow it on every lens. Everything else works the same, including the 1/8 s limit and the film grain.

See it

Find a moving subject in dim light, like a friend walking across a room at night. Hold the phone in your hand for both photos.

For the first photo, set the lowest ISO. The shutter gets slow, and your friend turns into a smear. The photo is clean, but the moment is lost.

For the second photo, raise the ISO until the shutter is fast enough to freeze your friend. Now the face is sharp, with speckle in the shadows.

The two photos below are by other photographers, of two different people. The first shows a slow shutter, and the second shows a shutter fast enough for a sharp face in dim light.

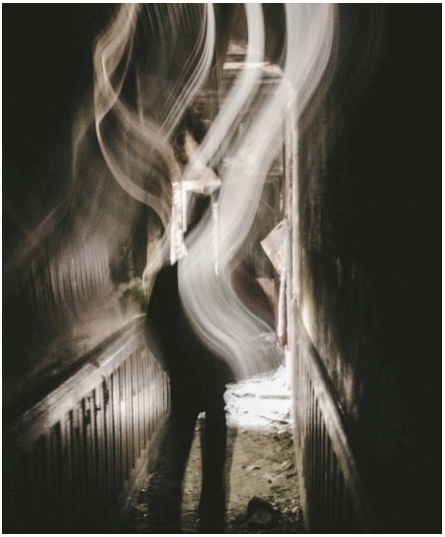




PHOTO PAIR A person walking down a dim hallway, smeared by a slow shutter (walker-blur.jpg). Photo: CHRSNDRSN, Unsplash, Unsplash License. / A man in a dark room, with his face sharp (dim-portrait.jpg). Photo: Lee Campbell, Unsplash, Unsplash License.

Common mistake

It's tempting to keep the ISO as low as possible, to avoid noise. In dim light, the shutter gets slow, and a moving subject comes out blurred. You can spot it in the photo. The still parts are sharp, but the moving thing is smeared, and the camera card shows a low ISO. The fix is to raise the ISO until the shutter is fast enough for your subject.

A smaller mistake is forgetting that you set the ISO. Later you shoot in the sun, or in the dark, with the wrong ISO. Before you shoot, look at the exposure line. If the ISO is orange and you don't need it, tap **Auto**.

Try it

1. Go to a dim room with some dark shadows.
2. Rest the phone on a table or shelf so it stays still.

3. Tap the ISO value and slide the dial to the lowest ISO. If the shutter turns red, the photo will be a bit dark. That's fine for this test.
4. Take a photo.
5. Slide the dial to the highest ISO and take another photo of the same spot.
6. Open each photo and **swipe up** to check its ISO on the camera card.
7. Pinch into the darkest part of each photo.
8. Tap **Auto** on the dial when you're done.

The low-ISO photo should look smooth in the shadows. The high-ISO photo should show speckle there, and maybe some color noise.

11. Aperture and depth of field



PHOTO Julia Margaret Cameron, *Sir John Herschel*, 1867. The Cleveland Museum of Art.

This is Sir John Herschel, a British scientist and astronomer. He also worked on the chemistry of photography. He gave us the words "negative" and "positive". Julia Margaret Cameron took this photo at his home in Kent, England, in April 1867. They'd been friends for about thirty years.

Cameron got her first camera in 1863, at about 48, as a gift from her daughter. For this portrait, she had Herschel wash his hair and mess it up so it would catch the light. She dressed him in black and brought her camera close to his face. His eyes, nose and the lines of his face are the sharpest part. The edges of his white hair and the cloth over his shoulders go soft.

Cameron wrote that when a picture looked "very beautiful" to her while focusing, "I stopped there." She didn't turn the lens to "the more definite focus which all other photographers insist upon." Some photographers of her time said her photos were out of focus. Her big camera, close to a face, gave her a very thin slice of sharpness.

What the f-number means

Aperture is the opening in the lens that the light comes through. On most real cameras, a ring of thin blades makes it bigger or smaller.

The size of the opening is written as an f-number. The f-number is the focal length divided by the width of the opening. Focal length is how strongly a lens magnifies (chapter 17). You'll see f-numbers written like this: f/1.4, f/2, f/2.8, f/4, f/5.6, f/8, f/11, f/16, f/22.

A small number means a big opening, which trips everyone up at first. So f/2 is a big opening, and f/16 is a small one.

Each step in that list is one stop. Going from f/2.8 to f/4 lets in half the light. The numbers go up by about 1.4 each step, because the opening's area halves.

On a real camera, aperture does two jobs. It sets how much light gets in. It also sets how much of the scene looks sharp from front to back.

Depth of field: how much looks sharp

A lens focuses at one distance. Things in front of it and behind it get softer the farther they are from that distance.

Depth of field is the part of the scene, from near to far, that still looks sharp.

Shallow depth of field means only a thin slice is sharp, and the rest melts into soft blur, like Herschel's hair and shoulders. It's good for portraits and close-ups, because it separates the subject from a busy background. That's figure and ground again (chapter 6).

Deep depth of field means everything from near to far looks sharp. It's good for landscapes and street scenes.

In 1932, a group of US photographers went the other way from Cameron. They called themselves Group f/64, and Ansel Adams and Edward Weston were in it. f/64 was a very small aperture on their big cameras, and it gave them photos sharp from front to back.

Four things that change depth of field, on any camera

1. **Aperture.** A bigger opening (a smaller f-number) gives a shallower depth of field.
2. **Distance to the subject.** The closer you are, the shallower it gets. On a phone, this is the strongest one you control.
3. **Focal length.** From the same spot, a longer lens, like a telephoto, gives a shallower depth of field. It also makes the background look bigger, so its blur shows more.
4. **Distance from the subject to the background.** The farther the background is behind the subject, the blurrier it gets. A person standing against a wall gets little blur. Put a park 30 meters behind the same person, and the background gets much softer.

Sensor size matters too. At the same framing and f-number, a bigger sensor gives a shallower depth of field. Phones have small sensors (chapter 21).

What this means on your phone

Your phone's aperture is fixed, and it's already wide. The iPhone 17 Pro Max main camera is ƒ1.8, and my iPhone Duo's main camera is ƒ1.6.

But the sensor is small, and the lens's real focal length is tiny. The 17 Pro Max's main lens is called 24mm, but that's in full-frame terms. Full-frame is the size of one frame of 35mm film, 36 × 24 mm. Lens lengths are often given as if the lens were on a camera that size. The real length of the 17 Pro Max's main lens is about 6.8 mm. So at normal distances, like a person a few steps away or a street, almost everything looks sharp. Only close subjects, like a flower or a cup of coffee, get a really blurry background.



PHOTO my white hibiscus, close up, with a playground soft behind it, in the Negative film (hibiscus-negative.jpg)

I took this with the flower close to the phone and the playground far behind it.

So on a phone, you control depth of field with distance and lens choice. Get close, and put the background far away. Or use a longer lens, like 2× or the telephoto.

Your phone's own camera app has a Portrait mode. Portrait mode doesn't open the aperture. It blurs the background in software after the shot. The phone works out how far away each part of the scene is, from two cameras, a depth sensor or machine learning. Then it blurs the background. It can go wrong at edges, like hair, glasses, or the gap between an arm and the body. Apple says ProRAW doesn't work with Portrait mode.

In Chobial

Chobial doesn't have a background blur or a Portrait mode, in the camera or the editor. In October 2026, I tried to add one. I tested depth on an iPhone 17 Pro Max, but the depth didn't come with the kind of RAW Chobial shoots. Getting it would have changed the RAW you get without telling you. So I dropped it. Chobial keeps the same RAW negative every time.

To get real blur from the lens:

1. Look at the **lens pill** along the bottom, in the middle, under the shutter. It shows 0.5×, 1×, 2× and so on, depending on your phone.
2. Tap **1×** or **2×**. The lens in use shows in a filled orange circle.
3. Get close to your subject. Make sure the background is far behind it.
4. Tap your subject in the picture to focus there (chapter 14).
5. Take the photo.



SCREENSHOT the lens pill, with 2× in orange

On iPhones with a 48 MP main camera, 2× is a crop from the middle of the sensor (chapter 17). From the same spot, it fills the frame with the middle of the scene, so the background blur looks bigger. The telephoto (4× or 5×, depending on the phone) is a real longer lens. From the same spot, it gives a shallower depth of field and makes the background look bigger.

The **exposure line** leaves out the aperture, because it never changes. To see it, tap your latest photo (bottom left) and **swipe up**. The camera card from chapter 1 shows the aperture, like "ƒ1.8". Above it, the lens line shows the

lens and its focal length in full-frame terms, like "24mm".

Chobial's masks find the subject, the sky, the background and people by themselves. A **Background** mask can darken the background so your subject stands out (chapter 27). Masks need Pro to save.

> **On Android:** The lens pill shows your phone's own lenses, like 0.6×, 1×, 3× and 5×, depending on the phone. There's no 2× crop on Android, so use the telephoto or walk closer. The camera card shows the aperture too.

See it

Shoot a cup at 1× twice, with the other side of a room far behind it.

For the first photo, hold the phone a hand's length from the cup. The far side of the room turns soft.

For the second, take a few steps back. Now the background is nearly as sharp as the cup.

The two photos below show two different cups, shot by other photographers. They show what the distance does.





PHOTO PAIR A cup from close up, with the background turned into soft blur (cup-close.jpg). Photo: Yuriy Vinnicov, Unsplash, Unsplash License. / A small glass cup seen from farther back, with the table and the window shutters behind it nearly sharp (cup-far.jpg). Photo: kabita Darlami, Unsplash, Unsplash License.

Common mistake

It's tempting to stand across the room and use 2× to blur the background, with the subject pushed against a wall. The background stays sharp. If you can read the text on the wall behind, the wall was too close to the subject. To fix it, move the subject away from the background, or move yourself closer to the subject.

A second trap: the telephoto lens usually can't focus as close as the 1× lens. If your subject won't get sharp on the telephoto, take a step back.

Try it

1. Pick a small subject, like a cup or a toy.
2. Put it on a table against a wall.
3. Tap **1×** (or **2×**) on the lens pill.

4. Get close, about a hand's length from the subject.
5. Tap the subject to focus, and take a photo.
6. Now move the subject, or yourself, so there's lots of room behind it. A long room or an open door to the garden works well.
7. Keep the same distance from the phone to the subject. Tap to focus, and take another photo.
8. Open each photo and compare the backgrounds. **Pinch** to zoom into them.

The wall in the first photo should be fairly sharp. The far background in the second photo should be soft.

12. The exposure triangle



PHOTO Russell Lee, *The Faro Caudill [family] eating dinner in their dugout, Pie Town, New Mexico*, October 1940. Library of Congress, Prints and Photographs Division, FSA/OWI Collection.

A family eats dinner in their dugout. A dugout is a house dug partly into the ground. Russell Lee, an American photographer for the FSA, took hundreds of photos in Pie Town, New Mexico, in 1940. Farmers settled the town, many of them from Texas and Oklahoma, and most of them lived in dugouts. Faro and Doris Caudill were farmers there. Lee shot this one in October, on a 35mm Kodachrome color slide.

We look at the table from a little above. A woman sits on the left and a man on the right. At the bottom left, a girl has a spoon at her mouth. A small boy has his back to us. On the checked tablecloth, a plate of biscuits sits on a

Karo syrup can, next to a big jar of milk. The faces, hands and food are sharp and clearly lit, and the colors are rich.

Now think about Lee's problem. Kodachrome was very slow, about ISO 10 (chapter 10), and a dugout doesn't get much light. A slow shutter would blur the moving hands and spoons. A wide-open aperture would make only a thin slice of the table sharp. And he couldn't turn the ISO up at all, because the speed of his film was fixed. We don't know if he used a flash, or how he set his camera. But the people were moving, and the photo is sharp, so he found enough light or made the right trades.

Three settings that trade with each other

You've met shutter speed (chapter 9), ISO (chapter 10) and aperture (chapter 11) one at a time. The exposure triangle is the three settings that together decide the exposure. If you change one and want the same brightness, another one has to change the other way.

Each setting gives you light, and each one charges you for it:

- **Shutter speed.** A longer time lets in more light, but it risks motion blur and camera shake.
- **ISO.** A higher ISO makes the picture brighter, but it shows more noise.
- **Aperture.** On a real camera, a bigger opening lets in more light, but it gives a shallower depth of field.

All three are measured in stops. To keep the same brightness, one stop more from one setting needs one stop less from another.

On a phone, these are all the same brightness: 1/60 s at ISO 400, 1/125 s at ISO 800, and 1/250 s at ISO 1600. Each step halves the time and doubles the ISO. (1/60 to 1/125 isn't exactly double, but photographers call it one stop.) On a real camera at the same ISO, f/4 at 1/125 s, f/2.8 at 1/250 s and f/5.6 at 1/60 s are all the same brightness too.

The meter (chapter 8) picks a brightness. The triangle decides how you get there, so it decides which costs you pay.

The light itself is a fourth way. Move to a window, go outside, or add a lamp or a flash (chapter 16). With more light, none of the three settings has to give as much.

On a phone, the triangle is a line

Your phone's aperture is fixed, so you can move only two corners: shutter and ISO. Sorry, it's less of a triangle and more of a line. Depth of field on a phone comes from distance and lens choice (chapter 11), and those don't change the brightness.



PHOTO a carousel in a park, iPhone Duo, 1/200 s at ISO 40, in the Chrome film (carousel-chrome.jpg)



PHOTO my cappuccino on a stone table, iPhone 17 Pro Max, 1/50 s at ISO 800, in the Chrome film (cappuccino-chrome.jpg)

Each phone has its own fixed aperture: ƒ1.6 on the Duo and ƒ1.78 on the 17 Pro Max. They're only a third of a stop apart. The light is what changed a lot. Outdoors at the carousel, there was so much light that a short time and a very low ISO were enough. The cappuccino was indoors, so it needed a longer time and a much higher ISO.

Pick the one that matters and let the others follow

Ask what matters most in this photo. Set that one, and let the camera set the other.

- **Something moving** (kids, pets, sport, people walking). Set the shutter first: about 1/250 s for people walking, and 1/500 to 1/1000 s for running kids and dogs (chapter 9). The ISO follows, and you accept the noise.
- **Phone resting on something, nothing moving, dim light** (a building at night, a still life). Set the lowest ISO for the cleanest photo, and the shutter gets long. In Chobial, with only the ISO set, the camera won't go slower than 1/8 s. For longer times, set the shutter too.
- **Blur on purpose** (silky water, light trails), with the phone resting. Set a long shutter, like 1/4 s or longer. The ISO follows down. In bright light, the ISO can't go low enough and turns red (chapter 9).
- **Hand-held, dim, nothing much moving.** Raise the ISO before the shutter gets slower than about 1/30 s. Most people can hold a phone steady down to about there (chapter 9). A sharp, grainy photo beats a clean, blurry one (chapter 10).
- **Only the brightness is wrong.** Leave ISO and shutter to the camera, and use EV (chapter 8).
- **Not sure.** Leave everything to the camera. It's good at this.

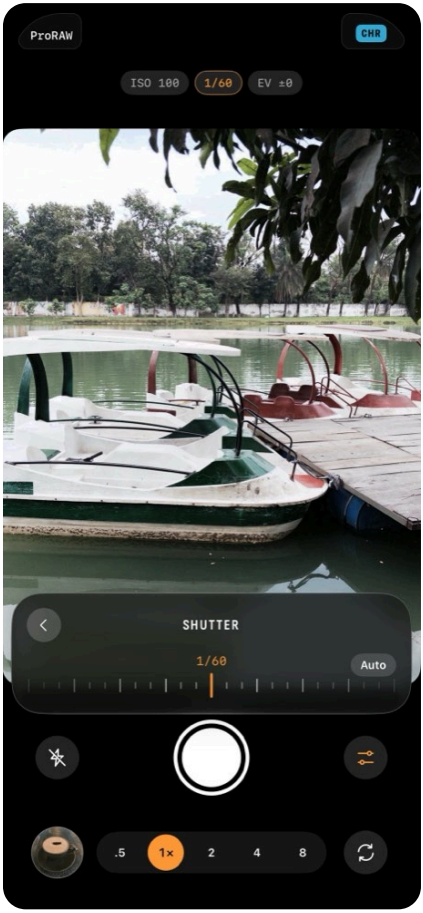
In Chobial

Chobial has no exposure modes to pick. What you touch is what you set.

1. Look at the **exposure line** under the Dynamic Island. It shows ISO, shutter and EV, like "ISO 64", "1/8547" and "EV ±0". Gray values are the camera's, and orange ones are yours.
2. Tap the ISO value or the shutter value. You can also tap **Controls**, the round button with sliders to the right of the shutter button, and then the

ISO or **Shutter** tile.

3. A dial opens across the bottom of the picture. Slide it sideways. Each tick is a click, a third of a stop apart.
4. To set the other value too, tap ‹ to go back to all the controls, then the other tile.
5. To give one value back to the camera, tap **Auto** at the top right of its dial. **Back to Auto** in the Controls panel gives back everything.



SCREENSHOT the exposure line with the shutter in orange and the ISO in gray, and the shutter dial open across the bottom

Your values stay set, photo after photo, until you tap **Auto** or **Back to Auto**.

There are four combinations:

- **You touch nothing.** The camera sets ISO and shutter. Drag up or down on the picture to change EV (chapter 8).
- **You set the ISO only.** The camera sets the shutter, but never slower than 1/8 s. EV changes the shutter.
- **You set the shutter only.** The camera sets the ISO. EV changes the ISO.
- **You set both.** You set the whole exposure, and the camera changes nothing.

When the camera still sets one of the two, its value turns red if it can't reach the brightness you asked for.

When you set both, the EV value turns gray and becomes a reading of how far you are from the meter. EV +1.0 means your photo will be one stop brighter than the meter would make it. EV −1.0 means one stop darker, and EV ±0 means you match the meter. It changes live as you turn the dials or move the phone. You can't change it: tapping it, dragging on the picture and the **Exposure** tile in Controls all do nothing. Nothing turns red either, so the EV reading is your warning. The viewfinder shows the brightness the photo will have.

With both set, the 1/8 s limit is gone. The shutter dial goes as long as your phone and lens allow.

To check a photo later, tap your latest photo (bottom left) and **swipe up**. The camera card shows the shutter, the ISO and the aperture, like "ƒ1.8". A value you set by hand has an "M" after it, like "1/1000 M" or "ISO 3200 M".

Chobial shoots RAW by default, so a photo that's a bit too dark or bright can often be fixed later (chapter 26). Blur can't, and a part gone pure white has lost its detail (chapter 13).

> **On Android:** The **ISO** and **Shutter** tiles show only on a lens that lets apps set them. Some phones don't allow it on every lens. Everything else works the same, including the gray EV reading with both set.

See it

Find running water, like a tap or a small fountain. Rest the phone on something, and set both the ISO and the shutter by hand.

For the first photo, set the shutter to 1/1000 s. Turn the ISO up until EV reads ±0. The drops freeze in the air, and you'll see noise in the shadows.

For the second photo, set the shutter to 1/15 s. Turn the ISO down until EV reads ±0 again. The water turns soft, and the shadows are clean.

If a dial runs out before EV reaches ±0, get as close as you can, or try the scene in different light. Both photos have about the same brightness, but they cost different things.

Common mistake

The trap is learning the three settings on their own and never trading them. You set ISO 100 because "low ISO is good". Then the shutter gets slow, and your running dog turns into a blur. Or you set 1/1000 s and forget about it, and indoors the ISO climbs into heavy noise.

You'll know you're in this trap when you can say which setting is "good" but not what it cost. To fix it, ask one question before each photo: what matters most here, the movement, the noise or the depth? Set that one, and let the camera move the other.

A second trap comes with both values set, because the camera can't follow the light anymore. Walk from shade into sun, and the photo comes out far too bright. The EV reading shows it, far from ±0, like +2.7. Turn a dial until it's back to ±0, or tap **Back to Auto**.

Try it

Pick a scene with a little movement, like a fan or people passing by.

1. Tap the shutter value in the exposure line, pick a time and take a photo.
2. Tap **Auto** on the shutter dial. Tap the ISO value, pick an ISO and take a photo.
3. Keep the ISO set. Tap ‹, then the **Shutter** tile. Turn the dial until EV reads ±0, and take a photo.
4. Tap your latest photo and **swipe up**. Check the camera card for each of the three photos. What did the camera choose each time?
5. Look for blur in the moving parts, and **pinch** to zoom into the shadows for noise. What did each photo cost?
6. Open **Controls** and tap **Back to Auto**.

13. The histogram and your highlights



PHOTO Ansel Adams, *Old Faithful Geyser erupting, Yellowstone National Park*, 1941–42. National Archives, Ansel Adams Photographs of National Parks and Monuments (Mural Project).

A tall white column of steam and water rises into a dark sky. It's Old Faithful, a geyser in Yellowstone. A geyser is a hot spring that shoots water and steam into the air. Look at the brightest parts of the steam. They still have soft gray shading and texture. They haven't turned into a flat white shape. That's the goal of this chapter: whites that keep their detail.

Ansel Adams (1902–1984) was an American photographer, best known for black-and-white photos of the national parks of the American West. He helped found Group f/64 (chapter 11). In 1941 the US Department of the Interior hired him to make photos for a mural about the national parks. A mural is a wall-size picture. This one was for the department's building in Washington, DC. World War II stopped the Mural Project in 1942. The National Archives keeps 226 photos from it, most of them signed and captioned by Adams. This geyser is one of them.

Around 1940, Adams and Fred Archer worked out the Zone System. It's a way to plan how bright each part of the scene will be in the final print. You plan it from black to white, before you take the photo. We don't know how Adams exposed or developed this photo. But photographers who shot negative film had a saying: "Expose for the shadows, develop for the highlights." They gave the film enough light for the dark parts. Then they controlled the bright parts when they developed the film.

On a phone, the rule turns around. You expose for the highlights, because a sensor can't save a white that's gone. Then you lift the shadows later.

How to read a histogram

A histogram is a graph of how bright the photo is. It sorts every pixel by brightness. The left edge is pure black and the right edge is pure white. The taller the graph at a point, the more of the photo is at that brightness.

Highlights are the brightest parts of a photo. Shadows are the darkest parts. Midtones are everything in between.

Read the edges first. A pile pressed hard against the right edge means the highlights clipped. A clipped (or blown out) part was so bright that the sensor recorded it as pure white, with no detail left. Shadows can clip too, and then photographers say they're crushed to black. That shows as a pile against the left edge. Everything in a pile at either edge is the same pure white or black.

There's no single right shape. A snowy field or a beach at noon should lean right. A black cat on a dark sofa should lean left. A hill in the middle is right only when the scene is mostly midtones.

Many histograms also show the red, green and blue channels, each color on its own. A red flower can clip in red while the overall graph looks fine. Then the petals lose their detail. If one color hits the right edge, lower the exposure a little.

Your phone screen is a poor judge of exposure. It's bright, its brightness changes, and the room light changes how it looks. A ruined sky can look fine on it. The histogram gives the same answer in any room.

Why a white sky can't come back

Each pixel on the sensor collects light, like a bucket collecting rain. When the bucket is full, more light can't be counted. Every full pixel reads the same top number. So a clipped sky is the same flat white in the RAW too. An editor can turn that flat white into a flat gray, but the clouds are gone.

Some whites are fine to clip. The sun, a lamp bulb and glints of sun on water or metal should be white anyway. A sky, a white shirt, a wedding dress, a face or clouds aren't.

Shadows are different. A RAW holds a lot in the dark parts. A part that looks black on the screen can often be lifted in the editor. It may show more noise (chapter 10), but the detail is there.

Expose for the highlights, lift the shadows later

Exposing for the highlights means setting the exposure so the important bright parts keep their detail. You brighten the dark parts later. With RAW, expose so the important highlights are just safe. The photo will look too dark on the screen, and that's expected.

Dynamic range is the range from the darkest to the brightest part a camera can record in one photo, with detail in both. A bright sky over deep shade can have more range than the sensor holds. Then you choose what to keep. Usually keep the sky, unless a face matters more. With chapter 8's backlit friend, the face won. You can also move, wait for softer light (chapter 7), use flash (chapter 16) or brighten one part later with a mask (chapter 27).

"Looks white" isn't always "clipped". I shot a spider lily on an iPhone in plain RAW. The white petals looked blown out. In the editor, I made the photo one stop darker, and pink color and texture came back in the petals.



PHOTO PAIR the spider lily as shot, petals looking blown out (lily-as-shot.jpg) / the same RAW one stop darker, pink and texture back (lily-pulled-back.jpg)

HEIF and JPEG photos have less room than RAW. The phone has already decided how the brightest parts fade to white. A highlight it gave up on can't come back. Chapter 22 explains formats. Chobial shoots RAW by default.

In Chobial

Chobial has two highlight guides in the viewfinder: a histogram and zebras. Zebras (or zebra stripes) are stripes the camera draws over the parts that are about to clip. They come from video cameras.

1. Tap **Controls**, the round button with sliders to the right of the shutter. You can also swipe up on the camera.
2. Tap the **Guides** tile. Its page has six tiles: Grid, Level, **Histogram**, **Zebras**, Live Film and Peaking. A tile that's on turns orange.
3. Tap **Histogram**. A small histogram appears in the top right corner of the picture. On an iPad or an iPhone Duo, it can sit in the side column instead. It shows a soft white shape for overall brightness, with red, green and blue traces over it. It updates live as you move the phone.
4. Tap **Zebras**. Dark diagonal stripes cover the parts that are about to clip. I made them near-black because white stripes would disappear over a blown white sky. That's right where you need the warning.
5. Both guides stay on, even the next time you open the app, until you tap them off.



SCREENSHOT the viewfinder with the histogram top right and dark zebra stripes over a bright sky

To change when the stripes show, open **Settings** from its tile in Controls. Under Guides, the **Zebras** slider goes from 90% to 100% in steps of 1%. It starts at 97%. At 100%, stripes show only on parts that are fully white. Lower numbers warn earlier.

Under it, **Zebras on** sets what the stripes measure. **Brightness** is the default. **Any color** also stripes a part where one color clips, like a red or blue neon sign that isn't very bright overall (chapter 41).

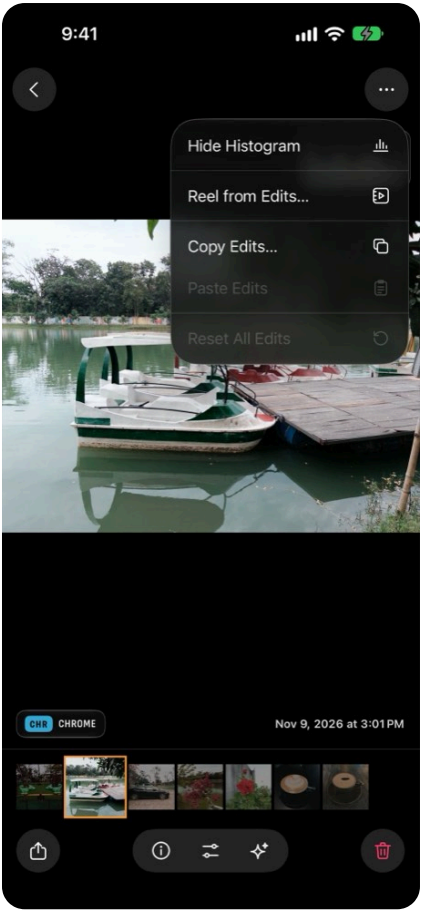
The viewfinder guides measure the camera's live picture before the film is added, so switching films doesn't change them. Some films fade their brightest parts gently (chapter 23). A film could show a soft sky on screen while the sensor is clipping it. The guides tell you what the sensor is recording.

Treat them as a warning. A RAW can sometimes hold a little more than they show, like the lily. But if stripes cover the sky, play it safe and lower the exposure.

To fix it, tap the sky or the brightest part that matters. The meter makes that spot middle gray, so the photo gets darker (chapter 8). Or, after a tap, drag down on the picture while the yellow sun shows, to lower EV. Or tap **EV** in the exposure line and slide its dial. Watch the stripes shrink until they're gone, or only on the sun. (Locking exposure is chapter 19.)

You can check the histogram after the shot too:

1. Tap your latest photo, bottom left, to open it.
2. Tap ••• at the top right, then **Show Histogram**. The menu item then reads **Hide Histogram**.
3. The histogram appears in the top right corner. This one measures the developed photo, with the film and your edits. It shows what will clip in the photo you export. It works while you view and edit, and hides while you crop. It stays on for the next photos you open.
4. To pull a highlight back, tap **Edit**, then the **Light** tool. Lower **Highlights** or **Exposure** to darken the bright parts. Raise **Shadows** or **Exposure** to lift the dark parts. Chapter 26 covers the Light tool.
5. If the clouds come back as you lower Highlights, the detail was there. If the sky only goes from flat white to flat gray, it clipped.



SCREENSHOT a photo with the histogram top right and the ••• menu open

See it

Find a tree, a building or a person in shade, in front of a bright sky.

First, tap the dark subject. The sky goes white and fills with stripes.

Second, lower EV until the stripes leave the sky. The photo looks dark. In the editor, raise Shadows and Exposure. The subject looks fine, and the sky keeps its clouds.

The two photos below show two different trees, shot by other photographers. They show the two results.





PHOTO PAIR A bare tree under a sky that has gone almost white, with no clouds left to see (tree-sky-white.jpg). Photo: Coed Pageant, Unsplash, Unsplash License. / A tree under a sky that keeps all its dark clouds (tree-clouds.jpg). Photo: Elbert Lora, Unsplash, Unsplash License.

Common mistake

You judge exposure by how bright the screen looks. Or you make the subject look nice and don't notice that the sky turned white.

To spot it, look for a pile against the right edge of the histogram, or stripes over the sky. To fix it, lower EV until the stripes leave the sky. Then lift the shadows in the editor.

A smaller trap is chasing a nice hill in the middle for every photo. Snow should lean right.

Try it

In chapter 0 you took ten photos on Auto, in bright and dark places, with sky in a few. Here's where you come back to them.

1. Tap your latest photo, bottom left, and swipe back to the first of the ten. Tap •••, then **Show Histogram**. It stays on for the others.
2. Look at the right edge of each histogram. Find the photos that lost the sky.
3. Open one of those. Tap **Edit**, then **Light**, and lower **Highlights**. If the clouds come back, the detail was there. If the sky turns flat gray, it's gone.
4. Now go out and turn on **Zebras** (**Controls**, then **Guides**). Point the camera at a scene with sky.
5. Lower EV until the stripes leave the sky. Take the photo, and compare it with your old one.
6. Before you leave, tap **EV** in the exposure line and tap **Reset**.

14. Focus and sharpness

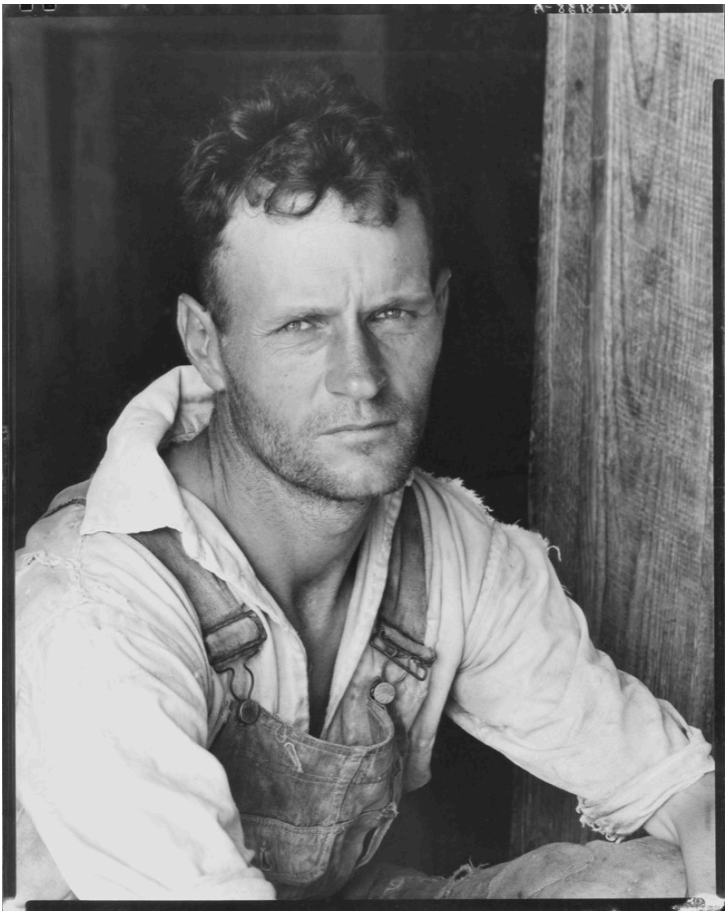


PHOTO Walker Evans, *Floyd Burroughs, cotton sharecropper. Hale County, Alabama*, 1935 or 1936. Library of Congress, Farm Security Administration/Office of War Information collection.

This is Floyd Burroughs, a cotton sharecropper in Hale County, Alabama. A sharecropper is a farmer who works land owned by someone else. He pays for the land with a share of the crop. The American photographer Walker Evans made this portrait in 1935 or 1936.

In summer 1936, Evans went to Hale County with the writer James Agee for a story for *Fortune* magazine. The magazine didn't print it. The work became the book *Let Us Now Praise Famous Men* (1941), where the families got made-up names.

Evans used a large camera, and the focus is exactly on the eyes. The photo is sharp enough to show every thread of his clothes and the stubble on his face. That's this chapter's lesson: choosing what to focus on.

What focus means

Focus is the distance the lens makes sharp. Things in front and behind get softer (chapter 11).

Autofocus is the camera moving the lens by itself to make a spot sharp.

Sharp means fine detail and clean edges. Soft means blurred.

Three reasons a photo comes out blurry

1. **Missed focus.** Missed focus (or "out of focus") means the camera made the wrong distance sharp. Your subject is soft, and something else is sharp, often the background, like a wall behind a face.
2. **Camera shake** (chapter 9). Everything is blurred, even the still parts. Holding still is in chapter 18.
3. **Motion blur** (chapter 9). Only the moving thing is blurred.

To tell them apart, zoom in and look for the sharpest part. If something is sharp, the camera worked but focused on the wrong place. If nothing is sharp, it's shake. If only the moving thing is soft, it's motion.

A fingerprint on the lens makes everything soft and hazy, so wipe it (chapter 18).

Sharpening in an editor makes edges look crisper, but it can't put back detail the lens didn't record. So you can't fix missed focus later (chapter 20 covers phone sharpening). And on a phone screen everything looks sharp, because the picture is small. Zoom in to check.

Focus on what people look at first

In a portrait of a person or an animal, that's the eyes. People look at eyes first. If the eyes are sharp, a soft ear or shoulder is fine. If the nose is sharp and the eyes are soft, the photo looks wrong. When a face is turned a little, focus on the eye nearer the camera (chapter 35).

For things, focus on the front of the subject, or on the detail that matters. That could be the text on a sign or the foam on a coffee.

On a phone, depth of field is shallow up close (chapter 11), so missing by a little shows. Far scenes are forgiving, because almost everything is sharp.

When autofocus gets it wrong

Autofocus needs detail and contrast. It has trouble with plain walls and clear skies, dim light, and very close subjects. Glass and windows confuse it too, because it may focus on the glass or on reflections. So do fences and wire in front of the subject.

Then it can pick the wrong thing, or hunt. Hunting is autofocus moving back and forth without settling. That's when you focus by hand. Focusing by hand (manual focus) means you choose the distance yourself.

Every lens also has a closest distance it can focus. Closer than that, nothing gets sharp, so step back a little.

In Chobial

Tap to focus

If you don't touch anything, the camera keeps focusing by itself on the middle of the picture.

1. Tap your subject. The camera focuses and meters there (chapters 7 and 8). A frame marks the spot, with a small sun beside it.
2. The tap holds until the scene changes a lot, for example when you move the phone. Then the camera goes back to the middle.
3. If you walk closer or farther, tap again, because the distance changed.

To keep focus fixed, touch and hold the picture for **AE/AF LOCK** (chapter 19).

> **On Android:** A tap holds for about six seconds. Then the camera goes back to measuring the whole picture. A face you're following stays followed. Holding a volume key also locks focus and exposure (chapter 19).

Following people and pets

When the camera finds a person or a pet, it draws thin white corners around them. On iPhone it looks for the faces and bodies of people, and the heads and bodies of cats and dogs. It's always on, with no switch in Settings.

1. Tap inside the corners. They turn green.
2. Focus and exposure now follow that subject as it moves. While the camera sets the exposure, it keeps the shutter at 1/125 s or faster (chapter 9).
3. If the subject turns away or goes behind something, the camera keeps following for about two seconds.
4. To stop following, tap somewhere else in the picture.

> **On Android:** Following finds people only, by their faces. It doesn't follow pets.

Focusing by hand

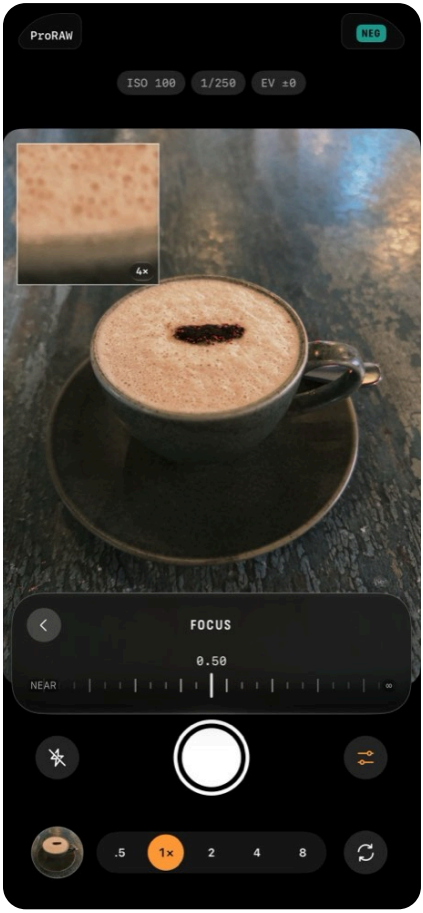
Do this for close-ups, through a window or a fence, in dim light, or when autofocus hunts. It also keeps focus at one distance for a series of shots, like when you wait for someone to walk to a spot.

1. Tap **Controls** (the round button with sliders, right of the shutter), or swipe up on the camera.
2. Tap the **Focus** tile. It only shows on lenses that can be focused by hand.
3. A dial lies across the bottom of the picture, from **NEAR** (the closest the lens can focus) to ∞ (infinity, far away). Slide it sideways. Each of its 41 ticks feels like a click.
4. Between the ends, the dial shows a number from 0.00 to 1.00. That's the lens position, not meters or feet. It helps you find the same spot again.
5. **MF** shows on the Focus tile and in the exposure line. It stays set, even after you close and reopen the app. Tap MF to open the dial again.
6. To give focus back to the camera, tap **Auto** at the top right of the dial, or tap the picture.

When the dial opens, two aids appear. A loupe is a small magnifier, like the glass jewelers use. In Chobial, the loupe is a square in a top corner that shows the spot you last tapped (or the middle) at 4×. It sits in the corner across from that spot, so it never covers your subject.

Focus peaking is colored lines over the edges that are in focus. In Chobial they're red. Slide the dial and watch the red move from near things to far things. Peaking shows which edges are sharp across the frame, and the loupe shows how sharp your spot is.

Peaking needs edges. A plain, smooth area shows no red even when it's in focus, so look for texture on your subject. Peaking reads the picture before the film is added, so grain and halation don't make false red lines. Neither aid ends up in your photo.



SCREENSHOT the Focus dial from NEAR to ∞, red peaking on a cup, and the 4× loupe in a top corner

Peaking is on by default. It's the last of the six Guides tiles from chapter 3. To turn it off, tap **Controls**, then **Guides**, then the **Peaking** tile (a tile that's on is orange). The same switch is in **Settings** › Guides › **Peaking**. The loupe has

no switch.

> **On Android:** The Focus dial, the 4× loupe and red peaking work the same.

Checking after the shot

1. Tap your latest photo (bottom left).
2. Pinch to zoom, or double-tap.
3. Look at the eyes, or the detail that matters.

See it

Put a cup close to the phone, a little farther than the closest it can focus. A few steps behind it, have something with detail, like a bookshelf. Shoot twice from the same spot. First tap the cup, then tap the shelf.

Each photo has a sharp part. Only in the first one is the sharp part the cup, your subject.

Common mistake

The camera focused on the background, and your subject is soft. You only notice at home on a big screen. To spot it, zoom in on the eyes right after the shot. To fix it, tap the subject before you shoot, or tap inside its corners so the camera follows it. A tap on a person aims at the middle of the face. To put focus on the eye itself, touch and hold on the eye (chapter 19).

A smaller trap: you focused by hand for a close-up and forgot. MF stays set, even the next day, so far scenes come out blurry. Look for MF in the exposure line, then tap **Auto** on the Focus dial, or tap the picture.

Try it

Focus on something close with the background soft, then the other way round.

1. Put a small object about 20–30 cm from the phone, with a detailed background a few steps behind. If the object won't get sharp, step back a little.
2. Tap the object and take a photo. Tap the background and take another.
3. Open **Controls** › **Focus**. Slide toward **NEAR** until the red lines sit on the object. Check the loupe, and take a photo.
4. Slide toward **∞** until the red moves to the background. Take a photo.
5. Tap **Auto**, so MF doesn't stay set.
6. Open the photos, zoom in, and compare.

15. Color and white balance



PHOTO Jack Delano, *View in a departure yard at C & NW RR's Proviso (?) yard at twilight, Chicago, Ill.*, December 1942. Library of Congress, Prints and Photographs Division, FSA/OWI Collection.

You met Jack Delano in chapter 10, with his Chicago freight terminal at night. He took this photo in December 1942, on Kodachrome for the US Office of War Information. The "(?)" is in the Library of Congress's own title, because the catalogers weren't sure which yard it was.

Twilight lights almost everything. The sky, the frosty, snowy ground and the rails are deep blue-violet. A tall tower and freight cars fade into the mist. But on the left, the windows of a small yard building glow warm yellow-orange. In the front, a round switch lamp shines pale yellowish-white. Thin, wiggly lines of gold-white light cross the tracks. They're probably lanterns carried by workers who walked through the frame while the shutter was open.

So one frame has two colors of light: the cool blue of twilight and the warm orange-yellow of lamps. Delano had no white balance setting, so his film kept both colors as they were.

Light has a color, even when it looks white

In chapter 1, a white wall looked orange at sunset because the light was orange. Your eyes and brain adjust to the color of light, so you don't notice. The camera doesn't adjust. It records the light as it is.

Color temperature is the color of a light, given as a number in kelvin. Kelvin (K) is the unit for color temperature. Low numbers are orange light, and high numbers are blue light.

Warm means orange, yellow or red. Cool means blue.

The scale feels backwards, and the reason is hot metal. Heat a piece of metal, and it glows red, then orange, then yellow-white, and bluish-white when it's very hot. The kelvin number is the temperature of that glowing metal.

Some rough numbers (real lights vary):

- Candle flame: about 1900 K.
- Old-style household bulb and "warm white" LED bulbs: about 2700–3000 K.
- Low sun near sunrise or sunset: about 3000 K or lower.
- Midday sun: about 5000–5500 K.

- Cloudy sky: about 6500 K.
- Open shade: about 7500 K or more.
- Clear blue sky alone: 10000 K or more.

Tungsten is the metal wire that glows inside old-style light bulbs. Photographers call that warm bulb light "tungsten light".

Indoor photos go orange because bulbs are about 2700–3000 K, much warmer than daylight. Shade goes blue because the sun is blocked there, and only the blue sky lights your subject (chapter 7 promised you this). Blue hour is blue for the same reason: only the sky lights the scene.

What white balance does

White balance is a setting that tells the camera the color of the light, so it can make white things look white in the photo. The camera then removes that color. Under orange light it adds blue, and under blue light it adds orange.

A color cast is a color that tints the whole photo, like orange or blue, that isn't in the things themselves.

Neutral means with no color of its own: white, gray or black.

The number on a white balance dial is the light you're shooting under. It isn't the color you want.

- Set it to match the light, and white looks white.
- Set a lower number than the real light, and the photo turns bluer.
- Set a higher number than the real light, and the photo turns more orange.

In daylight (about 5500 K), 3200 K makes the photo blue, and 8000 K makes it orange.

White balance has a second direction too. Tint goes from green to magenta (a purplish pink). Some tube lights and LEDs give a green cast.

Auto white balance

Auto white balance is the camera guessing the light's color by itself. It works most of the time. But it can be fooled when one color fills the frame, like a big orange wall, a green lawn or a sunset. Mixed light fools it too.

The camera guesses photo by photo, so a series of photos of the same scene can come out in slightly different colors. If you set white balance yourself, they all stay the same.

Mixed light

Mixed light is two or more lights of different colors in one scene, like Delano's twilight and lamps. One white balance can make only one light neutral. If you set it to make Delano's lamps white, the sky and snow go even bluer. If you set it to make the snow white, the lamps go even more orange.

Pick the light on your subject's face, or on the thing that matters, and make that one neutral. Or keep both colors on purpose. In Delano's photo, the clash of the two colors is what makes the picture. Blue and orange are complementary colors (chapter 6), and the warm lamps stand out because everything else is cool. Lighting with lamps and mixing them comes in chapter 16.

When to keep the warmth

Sunsets, candlelight, a café with warm lamps and a fire should look warm. If you make them neutral, you remove the mood people remember. I think a slightly warm photo usually looks friendlier than a slightly blue one. And blue hour should stay blue, or why did you go out at blue hour?

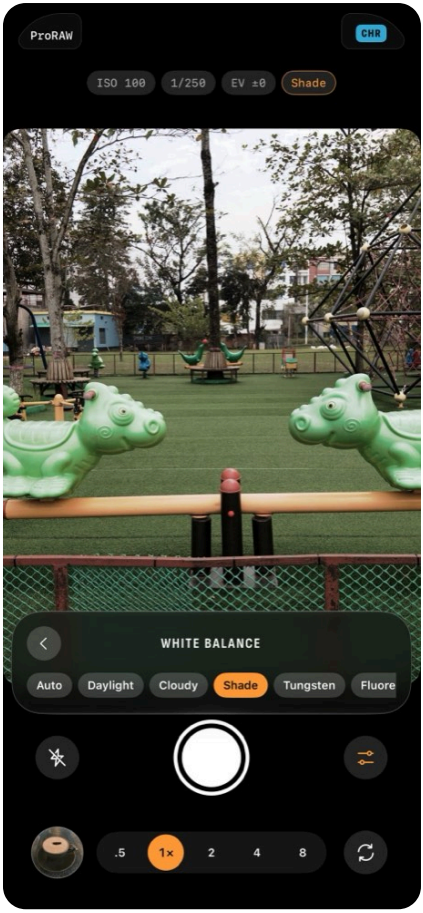
What film does

Color film can't change its white balance. Each film is made for one color of light. Film made for daylight turns bulb light orange. Film made for tungsten light (about 3200 K) turns daylight blue.

In Chobial

Setting white balance

1. Tap **Controls** (the round button with sliders, right of the shutter), or swipe up on the camera.
2. Tap the **WB** tile. On Auto, the tile shows a thermometer icon. When you set a value yourself, the tile shows it in orange.
3. A row of buttons appears. Scroll it sideways: **Auto**, **Daylight**, **Cloudy**, **Shade**, **Tungsten**, **Fluorescent**, **Kelvin** and **Gray Card**. The one in use is orange.
4. Tap the one that matches your light. The viewfinder shows the change at once, with the loaded film on top.



SCREENSHOT the WB buttons open below the viewfinder, with Shade in orange

Each preset is set to one number:

- **Daylight**: 5500 K
- **Cloudy**: 6500 K
- **Shade**: 7500 K
- **Tungsten**: 3200 K
- **Fluorescent**: 4000 K, with a small tint change for tube lights

Tap **Kelvin** to choose the number yourself. A dial appears above the row. Slide it from 2500 K to 10000 K, in steps of 100 K. It shows the number, like 5600K. The first time, it starts at 5600 K.

Using a gray card

A gray card is a card printed in an even, neutral gray, used to set white balance. A white wall or white paper works too.

1. Tap **Gray Card**. The button turns orange and says **Cancel**. A note at the bottom of the picture says "Tap something neutral — a gray card, a white wall".
2. Tap the neutral thing in the picture. It must be in the same light as your subject.
3. The camera measures it and switches to **Kelvin**, set to what it measured (for example 5240K). It also sets the tint, which has no dial.
4. If the spot is too dark or too bright, the phone buzzes. A message says "That patch is too dark or too bright to read a white balance from". Try another spot that isn't in deep shadow or shining bright.
5. To stop without measuring, tap **Cancel**.

Seeing and undoing your setting

While white balance isn't on Auto, its value (like **Tungsten** or **3000K**) joins the exposure line in orange. Tap it to open the white balance buttons again.

White balance stays set, photo after photo, even after you close and reopen the app. To give it back to the camera, tap **Auto**. **Back to Auto** in the Controls panel gives back everything you set. **‹** goes back to all the controls.

Some lenses can't take a white balance set by hand. Then the WB tile isn't there for that lens, and the camera uses Auto.

Changing it later

Chobial shoots RAW by default, so you can still change white balance afterwards, with the most room. Open the photo, tap **Edit**, then the **Color** tool. Use **Temperature** (−3000 to +3000 K, where plus is warmer and minus is cooler) and **Tint** (−50 to +50). Chapter 26 covers the Color tool. HEIF and JPEG have less room for big changes (chapter 22).

Some of Chobial's films are a little warmer or cooler on purpose (chapter 23). There's also a **Tungsten** film, which comes in chapter 16. The **Tungsten** film and the **Tungsten** white balance button are two different things.

> **On Android:** White balance works the same, with the same buttons, the same Kelvin dial from 2500 K to 10000 K, and **Gray Card**.

See it

Find a person in open shade on a sunny day. Stand them at the shady side of a building, facing the open sky. Shoot twice from the same spot, with the same film.

- First: **Daylight** (5500 K). The skin looks a little blue and cold, and gray clothes look bluish.
- Second: **Shade** (7500 K). The skin looks natural and warmer, and gray looks gray.

Common mistake

Last night you set **Tungsten** indoors. Today every photo outside is blue. White balance stayed set.

To spot it, look for a blue cast in the photo, and for **Tungsten** in orange in the exposure line. To fix it, tap **Tungsten** there, then tap **Auto**. Or tap **Back to Auto** in Controls.

A smaller trap is turning the Kelvin dial the wrong way. The photo is too orange, so you turn the number up, and it gets even more orange. Remember that the number is the light's color. If the photo is too orange, lower the number. If it's too blue, raise it.

Try it

Shoot one lamp-lit scene at 3000 K, 5500 K and 8000 K.

1. At night or in a dark room, turn on a lamp with a warm bulb. Put something white in its light, like a sheet of paper, next to an object you like.
2. Open **Controls** › **WB**, tap **Kelvin**, and slide to 3000K. Take a photo.
3. Slide to 5500K. Take a photo.
4. Slide to 8000K. Take a photo.
5. Tap **Auto**, so the setting doesn't stay.
6. Compare the three photos. The 3000 K photo should be close to neutral, because a warm bulb is about 2700–3000 K. The 5500 K one turns orange. The 8000 K one turns very orange.

Pick the one you like. It may not be the "correct" one.

For an extra step, tap **Gray Card**, tap the paper, and see which number the camera measured.

16. Flash and light you bring

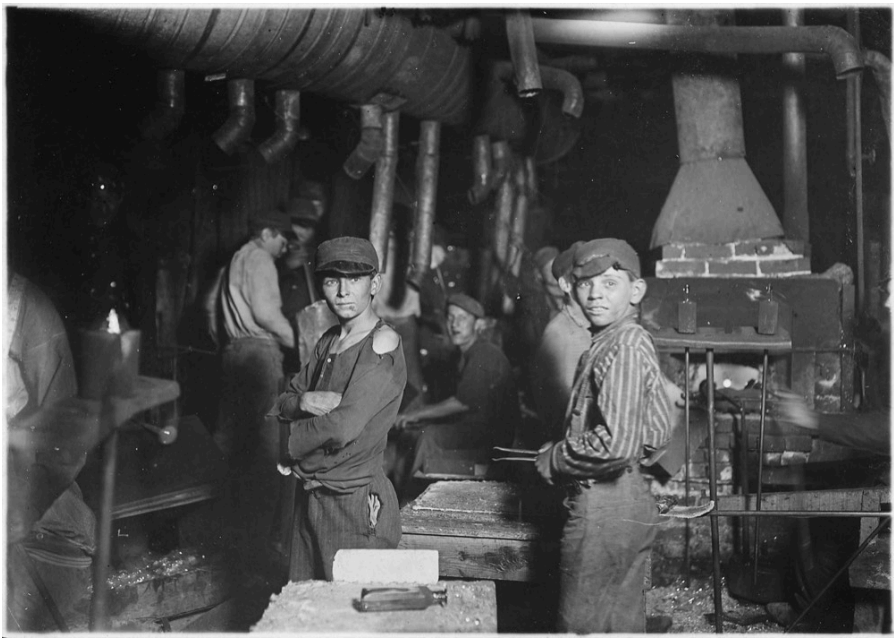


PHOTO Lewis W. Hine, *Glass Works. Midnight. Indiana*, August 1908. U.S. National Archives, Records of the Children's Bureau.

Lewis W. Hine took this photo inside a glass factory at midnight, in August 1908. He took it for the National Child Labor Committee, a group that worked against child labor. His photos were printed in its reports from 1908 on.

Two boys in caps stand in front, facing the camera. The boy on the right wears a striped shirt. Behind them, men and other boys are at work. Big pipes run along the ceiling, and a metal hood hangs over a furnace on the right. A small flame burns on a table at the left.

Hine lit the scene with flash powder. Flash powder is a powder that photographers set alight to make one very bright, very short flash. Look where the light landed. The two boys in front are the brightest part of the

picture, and they're sharp. The people farther back are dimmer. The far corners and the top left are dark. A flash lights what's close strongly and what's far weakly. The flash gave light where there was almost none, and it also made the bright-face, dark-background look.

What a flash does

Flash is a short, bright burst of light made at the moment of the photo. On a phone, it's a small LED next to the lenses. A phone's flash is small and weak compared with a real camera's flash. It lights things only a few steps away.

Why the background goes dark

Light falls off fast with distance. If a thing is twice as far from the light, it gets only a quarter of the light. Photographers call this the inverse-square law.

So with a flash, a face one step away is bright. A wall five steps behind gets almost nothing and goes dark. That's the "bright face on a black background" look, the same as in Hine's factory.

Flat light with hard shadows

The flash sits right next to the lens, so it's front light (chapter 7). Front light is flat, with few shadows to show the shape of a face. The flash is also hard light (chapter 7). So if there's a wall right behind your friend, their shadow on it has sharp edges.

Red eye

When the flash is close to the lens, light can bounce off the back of a person's eyes. Then the pupils come out red in the photo.

When flash helps

Against the sun. Fill light is extra light that brightens the shadows without being the main light. Say the sun is behind your friend (backlight). Their face is in shadow. A flash from close up fills the face with light. It works only when your friend is close, because the phone's flash is weak.

In the dark. Flash gives light where there is none, like in Hine's factory. With more light on a close subject, the camera doesn't need such a long shutter time. So moving hands and faces blur less.

When flash hurts

Flash looks bad on a face lit from straight ahead in a dim room or at night. The face comes out flat, shiny and too bright. The background is black or very dark. And the warm mood of the room's lamps is gone.

Flash color and lamp color

A phone flash is about the color of daylight. Room lamps are warm. Household bulbs are about 2700–3000 K, and candles are about 1900 K (chapter 15).

So a flash at a lamp-lit table makes mixed light (chapter 15). The near face, lit by the flash, looks neutral. The room behind, lit by the lamps, looks orange. And if white balance is set to **Tungsten** (made for lamps) when the flash fires, the flash-lit face goes blue.

Light you bring

- **A lamp to the side.** Move a lamp to one side of your subject. That gives side light (chapter 7), which shows the shape of a face. A lamp with a shade is softer. So is lamp light bounced off a white wall.
- **A candle.** Candles are very warm (about 1900 K) and dim. Close to a face, a candle lights it warm and soft, and the room falls dark.

- **A screen.** A phone or laptop screen is a light too. Show something white and hold the screen close, to one side of a face. It gives soft side light, because the screen is bigger than the tiny flash. Screens are dim, so keep it close. They usually give a cooler, bluer light than lamps.
- **A reflector.** Hold white paper on the other side of the face (chapter 7). It fills the shadow.

Warm and cool on purpose

You can mix two colors of light on purpose. Put a warm lamp on the face. Then let a cool screen or blue window light come from the other side. You get warm and cool in one picture. Blue and orange are complementary colors (chapter 6), so they stand out against each other.

Tungsten film

Real color film made for tungsten light (about 3200 K) shows lamp light as neutral. Movie makers used such film for night and indoor scenes under lamps. Chobial has a film modeled on one, called **Tungsten**. It works a little differently, as you'll see below.

In Chobial

The flash button

1. Find the round button left of the shutter. That's **flash** (chapter 0).
2. Tap it to go from **Off** to **Auto** to **On**, and back to Off. Off is a crossed-out lightning bolt. Auto is a bolt with a small "A". On is a filled bolt, and it turns orange.
3. Set to **Auto**, the camera decides for each photo. It fires the flash when the scene is dark. In bright sun it usually won't fire, so for fill flash, choose **On**.
4. Set to **On**, the flash fires for every photo.

5. When you hide the controls, **FLASH** (On) or **FLASH AUTO** joins the exposure line. Tap it to change the flash mode, the same as the button.



SCREENSHOT the row under the picture, with the flash button in orange (On)

The flash setting stays as you left it, even after you close and reopen the app. **Back to Auto** in Controls gives back ISO, shutter, focus, white balance and EV, but it doesn't turn the flash off. Use the flash button for that.

For flash photos, I'd leave ISO and shutter on Auto, so the camera works out the exposure with the flash.

The flash button shows only for a camera that has a flash. If you switch to another lens, or tap **flip** (bottom right) for the front camera, and the button disappears, that camera has no flash. It depends on your phone.

You can give the round button another job, like the timer, in **Controls › Settings**: under **Buttons**, choose **Beside the Shutter**. Then flash moves to a **Flash** tile in **Controls** (the round button with sliders, right of the shutter).

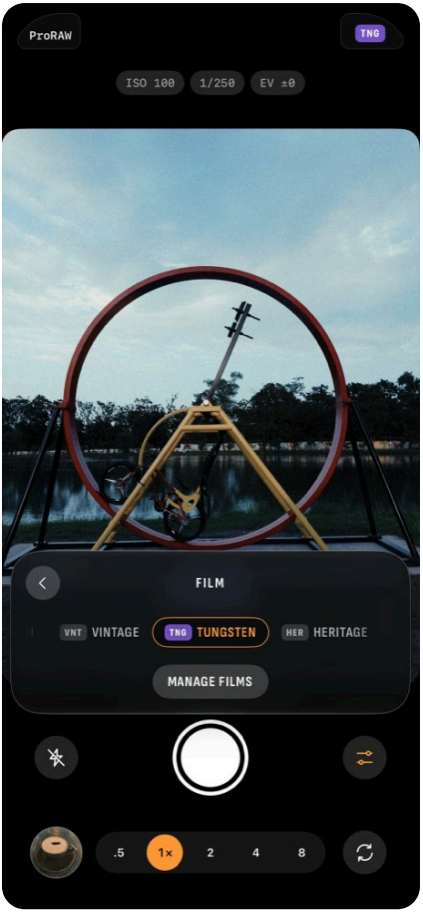
White balance under lamps

Chapter 15 has the steps. For a room lit by warm bulbs, open **Controls › WB** and tap **Tungsten**, or tap **Kelvin** and slide to about 2700–3000 K. That makes the bulbs' light neutral. To keep some warmth, stay on **Auto** or pick a higher number.

White balance stays set until you tap **Auto**. Chobial shoots RAW by default, so you can still change white balance later in the editor.

The Tungsten film

1. Swipe across the picture until **Tungsten** loads. Or tap the film's badge to the right of the Dynamic Island and slide the row of films. The film in the middle loads when the row stops. Its badge reads **TNG**.
2. If the viewfinder doesn't show the film's colors, turn on **Controls › Guides › Live Film**.



SCREENSHOT the film row with the TNG badge in the middle

The app says the film is "Tungsten motion picture film: cool, blue-leaning color, quiet greens and a glow round the lights." It's modeled on a tungsten-balanced movie film, Kodak Vision3 500T. It's made to look cool and a little blue.

The film goes on top of the white balance you set, so it adds a cool, blue lean. Under warm lamps, it takes some of the orange out. You get the cool night look of movie film, with a glow around bright lights like lamps and

street lights (chapter 23). It also has grain. In daylight, the photo turns cool and blue.

The **Tungsten** film and the **Tungsten** white balance button are two different things.

Tungsten is one of the Pro films. You can load it, see it and take photos in it for free. To save a photo in it out of Chobial, you need Pro.

> **On Android:** The flash button works the same: Off, Auto, On. It fires in a burst too, and with ISO or the shutter set by hand.

See it

Sit a friend at a dinner table at night, under warm lamp light. Shoot twice from the same spot, with the same film.

- First: flash **On**, straight from the phone. The face is bright and flat. The background is black, and the lamp's warmth is gone.
- Second: flash **Off**. Move a lamp to one side of the face, or ask your friend to turn toward the lamp. Leave white balance on **Auto**. Now there's side light on the face, the room is warm, and you can see the background.

Common mistake

The beginner trap is the phone's flash at night, from straight ahead. You get a bright face on a black background.

To spot it, look at the photo. The face is the brightest thing in it, and its shadows are gone. The room behind is black. You may also see red eyes, or a hard shadow on the wall.

Here are some fixes:

- Turn the flash **Off** and use the lamps in the room. Move your friend or a lamp, so the light comes from the side.

- Light the face with a second phone's screen.
- If you really need the flash, put something close behind your friend, like other people or a wall a step or two back. Then the background gets some flash too, and it doesn't go black. Also move your friend a little away from a wall right behind them, so there's no hard shadow on it.

Try it

Take three photos of one dinner-table scene, from the same spot.

1. Tap the flash button until it shows **On**. Take a photo.
2. Tap the flash button until it shows **Off**. Take a photo with only the room's light.
3. Keep the flash Off. Ask a friend to show a plain white picture or page on their phone, at full brightness. Have them hold it close to one side of your subject's face, out of the frame. Take a photo.
4. Check that the flash is **Off**, because it stays set.
5. Compare the three photos. Look for the one that keeps the room's mood, and for the one that shows the shape of the face.

For an extra step, develop photo 3 in the **Tungsten** film, or load **Tungsten** before you shoot. Then compare it with the others.

PART 2

Phone photography

17. Your phone's cameras



PHOTO Eadweard Muybridge, *Panorama of San Francisco from California Street Hill*, 1877. Library of Congress, Prints and Photographs Division.

Part 1 was about photography on any camera. From here on, it's about the camera in your pocket, which is really several cameras.

This photo is by Eadweard Muybridge, the running-horse man from chapter 9. In 1877, he stood at one high spot on California Street Hill in San Francisco, the hill now called Nob Hill. He made 11 photos on glass plates. For each one, he turned the camera a little further round. Put side by side, the 11 prints make one long picture of the whole city, all the way round.

Each plate on its own is an ordinary view, the way a normal lens sees. Joined together, they make a huge wide view. But everything in the panorama is the same size as in any single plate. The wider view fits more of the city in. It doesn't bring anything closer or push anything away.

Your phone's lenses work the same way. From one spot, 0.5×, 1× and 2× change how much of the scene fits. It's like cutting a bigger or smaller piece out of the same view.

Several cameras on one phone

Your phone has several cameras on the back. Each one has its own lens and its own small sensor. The lens pill switches between them.

- **0.5× ultra-wide** (chapter 4). It's around 13mm in full-frame terms.
- **1× main camera.** On recent iPhones, it's 24mm in full-frame terms. It's usually the phone's best camera. It has the biggest sensor and the widest aperture of the back cameras, so it's the best one in dim light. When in doubt, use 1×.
- **Telephoto.** A telephoto is a lens that makes faraway things look bigger. On phones it's 3×, 4× or 5×, depending on the model. It has a smaller sensor and lets in less light than the main camera. So in dim light its photos get noisier (chapter 10), or they need a slower shutter. It usually can't focus as close as 1× either (chapter 11).

The × number says how much a lens magnifies compared with the 1× camera. From the same spot, 2× shows things twice as big as 1×, so it covers half the width of the scene. 0.5× shows things half as big and covers about twice the width.

Field of view is how much of the scene a lens takes in, from side to side. So 0.5× has the widest field of view, and the telephoto has the narrowest.

On an iPhone 17 Pro or 17 Pro Max, the lens pill has 0.5×, 1×, 2×, 4× and 8×. Three of them are real cameras: 0.5×, 1× and 4×. The 1× and 4× cameras both have 48 MP sensors. The 2× and 8× are sensor crops.

Sensor crop: a closer view from the same camera

Many recent iPhones have a 48 MP main camera, but Chobial's normal photo from it is 12 MP. The phone joins each group of four pixels into one bigger pixel. Bigger pixels collect more light, so the photo has less noise.

A sensor crop uses only the middle part of the sensor. For 2×, the camera reads the middle quarter of the 48 MP sensor, one pixel for each pixel. That's 12 MP. It covers half the width and half the height of the full view, so things look twice as big. Every pixel is a real pixel, so the detail holds up.

Digital zoom enlarges part of the picture by stretching its pixels, and that makes it soft. Chobial's camera has no pinch to zoom in the viewfinder. It offers only the real lenses and these sensor crops.

The crop isn't a new lens, though. It's the same 1× camera, seeing less. From the same spot, a 2× photo looks exactly like a 1× photo cropped to its middle. So 2× gets the main camera's good lens, but its photo is at most 12 MP.

The 4× telephoto on the iPhone 17 Pro and 17 Pro Max has a 48 MP sensor too. So Chobial offers 8× as a sensor crop of it, also 12 MP. At 8×, even tiny movements of your hands show up (chapter 18).

Chobial adds a sensor crop only where the phone's camera offers it natively, and only where no real camera already sits near that number. A phone with a real 2× or 3× telephoto gets no extra crop there. iPhones with a 12 MP main camera have no 2× crop. If your lens pill shows no 2×, your phone doesn't have one.

You could shoot at 1× and crop later. I like 2× because you see the final framing in the viewfinder, with the film live on it. Focus and exposure are also measured on what's in that frame.

Formats on a crop lens

Plain RAW only comes from the whole sensor. So on a crop lens (2× or 8×), Chobial can't take RAW. It takes ProRAW on the Pro iPhones, and HEIF on other iPhones. The format label left of the Dynamic Island shows which one:

ProRAW or HEIF. Chapter 22 explains the formats.

If you chose RAW, Chobial keeps your choice. Go back to 1×, and it takes RAW again.

How the lens changes faces

Faces near the edges and corners of a 0.5× photo look stretched, wider and pulled toward the corner. The ultra-wide lens has to spread a very wide view onto a flat rectangle, and the corners get stretched the most. The middle of the frame looks much more normal.

Getting close changes a face too, for a different reason. With 0.5×, you tend to stand very close to fill the frame. Then the nose is much closer to the phone than the ears, so the nose looks big and the ears look small. That comes from the distance. Any lens does the same at that distance. The wide lens just tempts you to stand that close.

Now step back and fill the frame with the same face at 2×. The nose and ears are at nearly the same distance from the phone, so the face looks more like it does in real life. The background looks bigger and closer behind the person, and less of it fits. That's why 2× is a good portrait lens.

It's the Muybridge idea again. Where you stand decides how big near and far things look next to each other. The lens decides how much of that view fits in the frame.

Which lens for which subject

These are starting points.

- **0.5×:** big places you can't step back from, like small rooms, tall buildings and wide landscapes. Also a strong foreground with leading lines (chapter 4). Keep people out of the edges.
- **1×:** most things, and the best choice in dim light. Street scenes, food on the table, people in their surroundings.

- **2×:** portraits and half-body shots from a few steps back. Also details, and cutting a busy edge out of the frame.
- **Telephoto and 8×:** faraway things, a face from across a park, details on a building. These need good light and steady hands.

In Chobial

The lens pill sits at the bottom of the camera screen, in the middle (chapter 0).

1. Look at the lens pill. It lists the back cameras in order, like **.5**, **1**, **2**, **4** and **8** on an iPhone 17 Pro.
2. Tap a number to switch. You feel a light tap when it switches.
3. The lens in use shows its full name, like "2×", dark on a filled orange circle.
4. For the front camera, tap **flip** (bottom right).



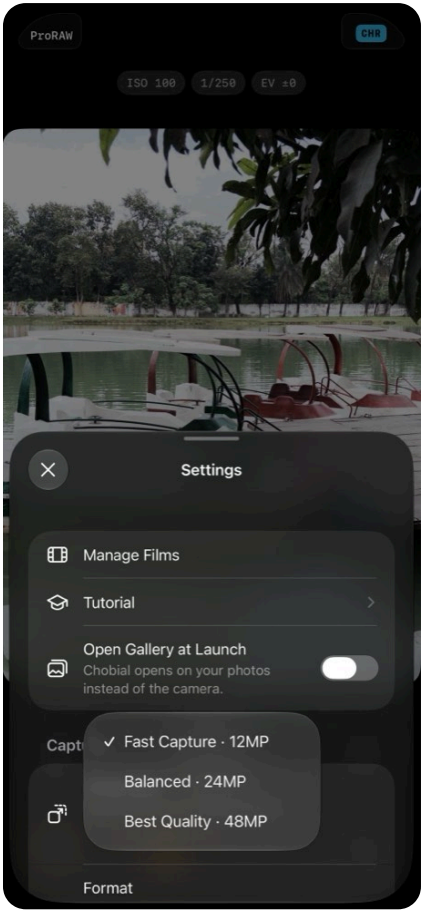
SCREENSHOT the lens pill on an iPhone 17 Pro, with 2× selected in orange

Chobial opens on the lens you last used, if the phone still has it. Otherwise it opens on 1×.

To choose how big each photo is:

1. Tap **Controls**, the round button with sliders, right of the shutter.
2. Tap the **Settings** tile.
3. Under **Capture**, find **Photo Size**.

4. Pick **Fast Capture · 12MP**, **Balanced · 24MP** or **Best Quality · 48MP**. The default is **Fast Capture · 12MP**. Only the sizes your cameras can give are listed, so a phone with only 12 MP cameras shows just **Fast Capture · 12MP**.



SCREENSHOT Controls › Settings with the Photo Size choices open

The note under it says "Smaller photos are taken faster". On most phones, asking for 48 MP makes each shot wait for its own processing. A photo can't be bigger than the camera gives, so a 12 MP camera gives 12 MP whatever you pick.

Some photos stay at 12 MP:

- RAW is always 12 MP. With RAW chosen, the note says "RAW is always 12MP". The larger sizes are for ProRAW, HEIF and JPEG.
- A sensor crop (2× or 8×) is at most 12 MP, because it uses only that part of the sensor. Asking for more would just stretch it.
- A burst is at most 12 MP, so the photos keep coming quickly.

I pick 48 MP for a still scene with lots of fine detail, in good light. That's when I may want to crop a lot or print big. The files are bigger (chapter 22). For people, moving things and everyday photos, 12 MP is faster.

> **On Android:** The lens pill lists your phone's own lenses, like .6, 1, 3 and 5, measured against the main camera. It also has a **Front** choice. There are no sensor crops, so every number is a real camera. For a 2× look, walk closer or use the telephoto. **Photo Size** shows the size your lens really gives, like "Balanced · 50MP". RAW is saved as DNG, and there's no ProRAW. Which lenses give RAW depends on the phone. A lens without RAW shows **NO RAW** in red and takes HEIF or JPEG. Android is in a closed beta.

See it

Take two photos of a friend in front of a busy street or a park. Frame their head and shoulders the same way in both.

For the first, use 0.5× and hold the phone close to their face. The nose looks big and the ears small. The background is wide and full of things. If the face is near an edge, it's stretched too.

For the second, use 2× and walk back until the face fills the frame the same way. The face looks natural. The background looks bigger and simpler.

The two photos below show two different people, shot by other photographers. They show a wide lens held close and a longer lens from farther back.

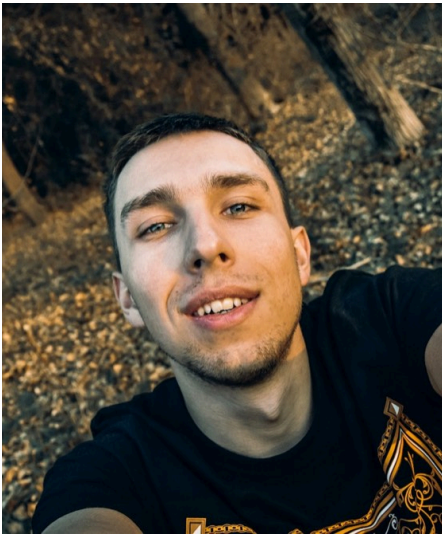




PHOTO PAIR A wide-angle selfie from very close, with a big face, a stretched arm and a wide, busy background (selfie-wide.jpg). Photo: George Pisarevsky, Unsplash, Unsplash License. / A head-and-shoulders photo from farther back, with a natural face and a plain sea behind (portrait-tele.jpg). Photo: Sasha Matveeva, Unsplash, Unsplash License.

Common mistake

The common trap is a portrait or a close group photo at 0.5×, with people at the edges. Faces near the corners look wide, and noses look big. To fix it, step back and use 1× or 2×. If you need 0.5× for the place, keep people near the middle.

A second trap is the telephoto indoors in dim light. The photo comes out noisy or blurred. Switch to 1× and walk closer.

Try it

1. Ask a friend to stand still.
2. Tap **.5**. Step close until their head and shoulders fill the frame. Take the photo.
3. Tap **1**. Step back until the framing matches. Take the photo.

4. Tap **2**. Step back again until it matches. Take the photo. If your phone has no 2×, use the telephoto, or skip this step.
5. Bonus: with a telephoto, try 4× or 5× too.
6. Open the photos. Compare the nose, the ears and how much background shows.

18. Holding still and pressing the shutter



PHOTO Alfred Stieglitz, *Winter—Fifth Avenue*, 1893. Library of Congress, Prints and Photographs Division.

This photo is by Stieglitz, from chapter 6. It shows Fifth Avenue in New York during a snowstorm. A coach pulled by horses comes up the snowy street toward the camera. The driver sits up high on it. Snow fills the air and covers the road, and the road has wheel tracks in it. Behind the coach, the buildings and other shapes fade into the snow.

In 1893, most serious photographers worked with the camera on a tripod. A tripod is a stand with three legs that holds a camera still. Stieglitz held his camera in his hands. He later said he stood in the storm in February 1893 for about three hours. The story goes that he waited until the coach came to the right place in the scene. Then he pressed the shutter.

So a sharp photo comes from three things. Hold the camera still, wait for the moment, and press the shutter gently. Brace, wait, press. Your phone is a hand-held camera too, so the same three steps work for you.

Start with a clean lens

Chapter 9 showed what camera shake looks like and how slow a shutter you can hold by hand. This chapter is about how to hold still and press without moving the phone.

Phone lenses get touched all the time, from pockets and fingers. A fingerprint or a little skin grease on the lens makes the whole photo soft and hazy. At night it also makes glow and streaks around lights. Wipe the lens with a soft clean cloth before you shoot. A glasses cloth works, and so does a soft cotton T-shirt.

How to hold the phone steady

- **Two hands.** Hold the phone at its edges, with both hands.
- **Elbows in.** Keep your elbows against your sides or your chest. Arms held straight out shake more, so keep the phone fairly close to you.
- **Feet apart.** Stand with your feet apart.

- **Lean on something.** A wall, a post or a door frame helps. You can also rest your elbows on a table, a railing or the top of a wall.
- **Put the phone down.** Rest the phone itself on something, or use a tripod. Small phone tripods and clamps exist too.
- **Breathe out.** Breathe out slowly, and take the photo in the pause at the end of the breath.

How to press without moving the phone

Your finger pushes the phone at the moment the photo is taken. If one hand holds the phone and the thumb of that same hand taps the screen, the phone tilts. A firm stab moves it more than a light touch.

A button on the side pushes the phone sideways. So squeeze it gently, with a thumb or finger on the other side of the phone to push back.

Keep still until the photo is taken. In Chobial, the volume buttons and Camera Control take the photo as the button comes back up, when you let go. So keep still until after you let go.

Camera Control is the button on the lower right side of recent iPhones. It's on the iPhone 16 and the later models that have it.

Take the photo without touching the phone

When the phone rests on something, the cleanest way is not to touch it at all at the moment of the photo. You can do this with the timer or a remote.

A self-timer is a delay between pressing the shutter and the photo being taken. With 3 seconds, your hand has time to stop moving the phone. With 10 seconds, you have time to walk into your own photo.

A remote, or remote shutter, is something that takes the photo without your hand on the phone. On an iPhone, your Apple Watch can be one.

A short burst at slow shutter speeds

When the shutter is slow, a short burst helps. Your hands move a little differently during each frame, so some frames come out sharper than others. Keep the sharpest one. Chapter 30 is about picking the best photos.

The slower the shutter and the longer the lens, the bigger the risk of shake. At 8× or on the telephoto, shake shows more (chapter 17). Night photos with a slow shutter are in chapter 21, and locking focus and exposure is in chapter 19.

In Chobial

Take a photo with the shutter

1. Tap the **shutter** for one photo.
2. Hold the **shutter** for a burst. The burst starts after a short hold of about a third of a second, so a firm tap doesn't start one.
3. Watch the counter above the shutter. It shows how many frames you've taken.
4. Let go to stop.

A burst takes up to about five photos a second. If the phone can't develop the photos fast enough, the burst stops. Then the app says "Burst stopped — developing what it took".

Either volume button also takes a picture while the camera is on screen.

Use Camera Control

1. **Click** Camera Control to take a picture.
2. **Light-press** it to bring up its controls.
3. **Light-press twice** to choose between **Film**, **Exposure**, **ISO** and **Shutter**.
4. **Slide** your finger along it to change the one you chose. Exposure moves in thirds of a stop.

The films come up in the order you set with ⇅ in the Films screen. With Camera Control, you can change the exposure and the film and keep your two-handed grip.

Set the timer

1. Tap **Controls**, the round button with sliders, right of the shutter.
2. Tap the **Timer** tile. Each tap goes Off → 3s → 10s → Off. The tile shows the value, like "3s".
3. Check the shutter. With the timer set, it shows "3s" or "10s" in orange above it.
4. Press the **shutter**. A big countdown number shows over the picture, and you feel a light tap each second. Then the camera takes the photo.
5. To call off a count, press the **shutter** again.



SCREENSHOT the camera with the Timer tile set to 3s, and "3s" in orange above the shutter

The timer stays set until you change it or close the app. The volume buttons and Camera Control use the timer too. With the timer set, a click starts the count, and another click calls it off. If you hold the shutter while the timer is counting, a burst starts at once and the count stops.

To reach the timer in one tap, choose **Controls › Settings › Buttons › Beside the Shutter › Timer** (chapter 16). On iPhones with a Dynamic Island, **Left of the Island** and **Right of the Island** can hold the timer too.

Use your Apple Watch as a remote

1. Open Chobial on the iPhone and keep it on screen. The watch can't take a photo on its own.
2. Open Chobial on the watch. The middle page shows what the phone sees, dimmed and small, behind a big shutter. Use it to check that the phone points where you want. The loaded film's name is at the top, the format is under it, and the exposure reading is at the bottom.
3. Tap the **shutter** on the watch.
4. For a delay, tap **Timer Off** under the shutter. Each tap goes 3s, 10s, Off. The wait happens on the phone. The phone shows the countdown on its screen, like its own timer, with a small tap you can feel each second. If the camera stops during the count, for example because you put the phone away, it takes no photo.

Swipe one page to the left for your films, or one page to the right for your recent photos.

Use Siri and Shortcuts

1. Say "Take a photo with Chobial", or name a film, like "Shoot Chrome with Chobial". Chobial takes one photo as soon as the camera is ready. If the timer is set, it counts down first.
2. To open the camera with a film ready and no photo, say "Load Gold in Chobial".

In the Shortcuts app, Chobial has two actions, **Take Photo** and **Open Camera**. Each one has a film you can choose.

Open the camera fast

Opening fast helps you catch the moment (chapter 6). It doesn't help with shake.

1. In the iPhone's **Settings** app, go to **Camera › Camera Control** and choose Chobial.

2. Click Camera Control on the Lock Screen. Chobial's camera opens.

It's the same camera, with films and **Controls**. The photos join your library the next time you open Chobial. You can also add the Chobial control to Control Center, or to the Lock Screen. The **Loaded Film** widget on the Lock Screen shows the loaded film, and a tap opens the camera. **Controls › Settings › Lock Screen & Camera Control** has a lesson on all of this.

Camera Control, the Apple Watch remote, Siri and Shortcuts are iPhone only. iPad has no Camera Control and no Watch remote.

> **On Android:** Android is in a closed beta. Either volume key takes a picture when you let go of it. With the timer set, it starts the count. If you hold a volume key for about half a second, it locks focus and exposure instead, with no photo (chapter 19). The timer (**Controls › Timer**) and burst work the same as on the iPhone. There's no Camera Control, no Apple Watch and no Siri.

> **On Android:** Tabletop mode is for foldable phones. You half-fold the phone and stand it on a table, like a small laptop. The picture moves to the top half. The bottom half has the loaded film, an exposure ruler, a bigger shutter and the timer as three buttons: **Off**, **3 s** and **10 s**.

> **On Android:** To open the camera fast, swipe down twice from the top, tap **Edit** (the pencil), and drag **Chobial** into Quick Settings. Tapping it opens the camera, on the lock screen too. Where the phone allows, choose Chobial for the lock screen's camera shortcut or for a double press of the side key.

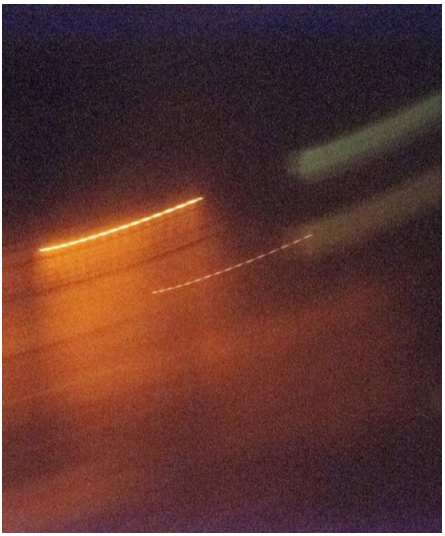
See it

Find a scene with still things in it, indoors in dim light or at dusk. Use 1× and set the shutter by hand to a slow time, like 1/8 s, as in chapter 9. Tap the shutter value in the exposure line to open the dial, and slide to the time.

For the first photo, hold the phone in one hand and take the photo with a quick tap of the same thumb. The whole photo is blurred, even the still things. That's camera shake.

For the second photo, rest the phone on a table or against a wall and use the 3 s timer. The still things are sharp.

The two photos below are two different night scenes, shot by other photographers. In the first, the camera moved while the shutter was open. In the second, it stayed still.



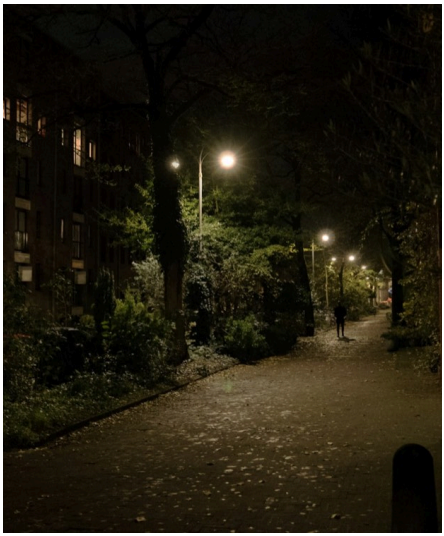


PHOTO PAIR A night photo where the camera moved, so every light became a smeared streak (shake-blur.jpg). Photo: Ksenia Pixelesse, Unsplash, Unsplash License. / A dark street at night, with the lamps, the path and the buildings sharp (night-sharp.jpg). Photo: Fons Heijnsbroek, Unsplash, Unsplash License.

Common mistake

The common trap is stabbing the screen with one thumb while the same hand holds the phone, often with the arm out. At slow shutter speeds, like indoors, in the evening or at 8×, the photo comes out blurred all over. You can spot it because everything is soft, even the still things (chapter 9). To fix it, use two hands and keep your elbows in. Squeeze a volume button gently. Or rest the phone and use the timer.

A second trap is a dirty lens. If your photos look hazy all over, or lights have glow and streaks at night, wipe the lens.

Try it

Shoot the same still scene five ways and see which gives the sharpest photo.

1. Switch to 1×. Set the shutter by hand to 1/8 s, or the slowest time you can manage.
2. Hold the phone in one hand and take the photo with a thumb tap.
3. Hold the phone with two hands, elbows in, and gently press a volume button.
4. Lean on a wall, breathe out slowly, and take the photo in the pause.
5. Rest the phone on something, set the **Timer** to 3s, and press the **shutter**. If you have an Apple Watch, try the watch for this one too.
6. Hold the phone with two hands and take a short burst.
7. Look at all the photos at full size and find the sharpest one.
8. When you're done, set the **Timer** back to Off. Then tap **Auto** on the shutter dial.

19. Tap, lock, adjust



PHOTO Ansel Adams, *Dark foreground and clouds, mountains highlighted, "Heaven's Peak," Glacier National Park, Montana*, 1941–42. National Archives, Ansel Adams Photographs of National Parks and Monuments (Mural Project).

This is Ansel Adams again, from the same 1941–42 project, this time at Glacier National Park in Montana. The sky fills about three quarters of the frame. It's full of clouds, and it gets darker toward the top. Low in the frame sits Heaven's Peak, a mountain covered in snow and lit by the sun. The snow is bright, but you can still see the lines of the rock layers in it, so the snow kept its detail. In front, on the right and at the bottom, a dark ridge of land falls into almost black shadow.

The photo looks exposed for the snow. Someone chose which part of the scene had to look right, and the snow on the peak won. The rest fell where it fell, and the foreground went almost black.

In 1941, no camera could focus by itself. Adams chose the focus himself, and he chose the exposure himself too. When he moved his camera, it didn't change its mind. Your phone does.

Your phone keeps deciding

If you leave it alone, your phone keeps choosing the focus and the exposure by itself. It does this over and over, as the picture changes. In Chobial, if you don't touch anything, the camera keeps focusing on the middle of the picture (chapter 14). It also judges the brightness again each time the scene changes.

So when you move the phone, the brightness can jump. Point at a street, and the street looks fine. Tilt up so more bright sky comes into the frame. The meter sees more light, so it makes everything darker (chapter 8). Tilt down, and the picture gets brighter again.

A tap helps, but only for a while (chapters 8 and 14). On iPhone, a tap holds until the scene changes a lot, for example when you move the phone. Then the camera goes back to the middle. So "tap, then move the phone to frame the picture" often doesn't work. Moving the phone is the change that makes the camera start deciding again.

Locking makes the camera stop deciding

To lock means telling the camera to stop deciding. The camera keeps the focus distance and the exposure it has now, even when you move the phone, until you let go.

AE means auto exposure. That's the camera choosing the exposure by itself. AF is short for autofocus. AE/AF lock locks both at once. The iPhone's own Camera app uses the same name. On many regular cameras, you can lock

focus the same way by pressing the shutter button halfway down.

After you lock, you recompose. To recompose means to frame the picture again after you've set focus and exposure, for example to put your subject on a third (chapter 3). Photographers call it "focus and recompose" or "lock and recompose".

Focus lock keeps a distance

A focus lock keeps one distance. If you walk closer or step back after locking, the subject goes soft (chapter 14). So lock again after you move your feet. Turning the phone a little is fine. Very close subjects are the most fussy, because depth of field is shallow up close (chapter 11).

Exposure lock keeps a brightness

An exposure lock keeps one brightness. The spot you lock on decides which part of the photo looks right.

Lock on the bright sky, then frame the street. The sky keeps its clouds and its color, and the street comes out darker. That's exposing for the highlights (chapter 13). You can often brighten the dark street in the editor later, because Chobial shoots RAW by default (chapter 26). But a sky that turned pure white can't come back (chapter 13).

Lock on the street instead, and the street looks right. The sky may go white.

When a lock helps

- **A face near a bright window or sky.** Lock on the face, then frame the picture with the window in it. The window won't make the face darker when it comes into the frame.
- **Waiting for a moment.** Lock focus on the spot where someone will walk or a bike will pass (chapter 6). Then wait and shoot. Chapter 14 showed you how to focus by hand for this. The lock is the quick way.

- **A series of photos of the same scene.** If all the photos should have the same brightness, lock once. The lock stays on from photo to photo.

Following a subject or locking a place

Following (chapter 14) is for someone. You tap inside the white corners around a person or a pet, the corners turn green, and focus and exposure move with that subject. A lock is for a place. It stays on one spot of the scene and doesn't move with anyone.

So use following for a subject that moves around, and a lock for a spot that stays where it is.

In Chobial

Lock focus and exposure

1. Touch and hold the picture on the spot you care about, for about half a second.
2. You feel a light tap. Orange corners frame the spot, and they stay there while the lock is on. (After a plain tap, the frame shows for only about a second.)
3. **AE/AF LOCK** shows in the top left corner of the picture, in small dark letters on an orange label.
4. The sun shows beside the spot, just like after a tap (chapter 8). While the sun shows, drag up to make the photo brighter or down to make it darker. The sun stays for about 2.5 seconds after you stop touching. The exposure stays locked, and your drag moves it brighter or darker from there.
5. Holding puts EV back to ±0 first, like a tap does (chapter 8). So hold first, then drag.
6. If the sun has gone, tap the **EV** value in the exposure line, under the Dynamic Island. The Exposure dial opens (chapter 8). Don't tap the

picture, because a tap on the picture lets go of the lock.

7. Move the phone to frame the picture. The focus and the brightness stay.
8. Take the photo. The lock stays on for your next photos too.



SCREENSHOT a hold on a bright sky, the orange corners on the clouds, AE/AF LOCK in the top left corner and the sun beside the spot

> **On Android:** Touch and hold works the same way, with the same **AE/AF LOCK** label. You can also hold either volume key for about half a second. That locks focus and exposure on the middle of the picture, and the orange corners show there. It doesn't take a photo. A short press of a volume key still takes a photo (chapter 18). On Android, a plain tap holds for about six seconds and then the camera goes back to measuring the whole picture (chapter 14). So on Android, the lock is the way to keep a spot for longer. Android is in a closed beta.

Let go of the lock

Tap the picture. The lock goes, and the camera focuses and meters on the spot you tapped. It's a fresh start, so EV goes back to ±0.

Changing lens with the lens pill (chapter 17) and focusing by hand with **Controls** › **Focus** (chapter 14) also let go of the lock. Focusing by hand is its own kind of lock on focus.

The lock stays when you move the phone, when the scene changes, when you take photos and when you swipe to another film.

AF LOCK: when you set the exposure yourself

If you set the ISO or the shutter speed yourself (chapters 9, 10 and 12), a hold locks only the focus. The label reads **AF LOCK**. The exposure is already in your hands, so there's nothing for the camera to lock.

If you set only ISO or only the shutter, the camera still picks the other one as you move. So the brightness can still change when you recompose. The sun still shows after the hold, and dragging still changes EV.

If you set both ISO and shutter, the brightness changes only when you change it. No sun shows after the hold.

If you set ISO or the shutter while **AE/AF LOCK** is on, the label changes to **AF LOCK**. From then on, only the focus stays locked. If you later tap **Auto** on both dials, the camera measures the light again as you move, and the focus

stays where you locked it.

To get the full **AE/AF LOCK**, give ISO and shutter back to the camera first. Tap **Auto** on their dials (chapter 12), then hold again.



SCREENSHOT AF LOCK in the top left corner, with ISO set by hand in the exposure line

Following and the lock

Holding on the picture stops following. The green corners go back to white. To follow someone again, tap inside their corners. On iPhone, Chobial follows people, cats and dogs (chapter 14).

> **On Android:** Following finds people only, by their faces. It doesn't follow pets.

See it

Take the same street scene with sky in two ways. For the first photo, frame mostly the street with some sky, and don't touch the screen. The camera judged the whole scene, so the street looks fine and the sky goes white.

For the second photo, hold on the sky until you see **AE/AF LOCK**. Then tilt down to the same framing and shoot. The sky keeps its clouds and its color, and the street comes out darker.

Neither photo is "right". You pick which part matters, like the snow in Adams's photo.

Common mistake

Tap, then reframe. You tap a face, then move the phone to put the face on a third. The camera counts the move as a big change and goes back to the middle. The focus jumps to the background, or the brightness changes. You can spot it: the frame around your spot is gone, and the face is soft or dark in the photo. The fix is to touch and hold instead. Check for **AE/AF LOCK**, then reframe.

Forgetting the lock. You locked on a bright sky, then turned to a dark doorway. The photo comes out far too dark. It can also be blurry, because the focus is still on the far distance. You can spot it: the orange **AE/AF LOCK** label is still in the top left corner. The fix is to tap the picture to let go.

Try it

1. Find a street or a row of houses with bright sky above. Use 1×.

2. Frame mostly the street, with a strip of sky at the top. Don't touch the screen. Take a photo.
3. Point the phone up so the sky fills most of the frame. Touch and hold a bright part of the sky until **AE/AF LOCK** shows.
4. Tilt back down to the same framing as in step 2. The picture stays dark and doesn't get brighter.
5. Take a photo.
6. If you like, take a third photo. Before you shoot, drag up a little while the sun shows, or tap the **EV** value in the exposure line.
7. Tap the picture to let go of the lock.
8. Tap your latest photo in the bottom left corner to open your photos. Compare the sky and the street in each one.

20. What your phone does without asking



PHOTO Gustave Le Gray, *The Great Wave, Sète*, 1857. The Metropolitan Museum of Art.

A wave breaks on the Mediterranean at Sète, in the south of France. The sea is dark, the sky is bright with clouds, and light shines off the water.

In 1857, one glass negative couldn't record both the bright sky and the darker sea well. So Le Gray made two negatives. He exposed one for the sea and one for the sky. Then he printed both onto one sheet of paper and joined them at the horizon. The Met says you can still see the join there.

Le Gray merged two pictures into one because the plate couldn't hold the whole scene. He did it by hand, on purpose, for one picture. Your phone does the same kind of merging for most photos, by itself, usually in a fraction of a second. It doesn't ask you first.

What happens when you press the shutter

When you press the shutter in your phone's own camera app, the phone often takes several frames very quickly. Then it lines them up and merges them into one photo. Many phones start keeping frames before you even press the shutter. Merging many frames lowers noise. Frames at different brightness keep detail in both the bright and the dark parts.

Then the phone runs noise reduction, sharpening and tone mapping, and it picks the white balance and colors. All this happens in a moment, before you see the photo.

Sharpening makes edges look crisper. It makes the light side of an edge lighter and the dark side darker.

Local tone mapping makes dark areas brighter and bright areas darker, one area of the photo at a time. Each area gets a different amount, so everything is easy to see. A face with the sun behind it ends up about as bright as the sky. The whole photo looks evenly lit.

Apple's and Google's names for the merging

- **Smart HDR** merges several frames at different brightness. The photo keeps detail in the bright sky and in the shadows. HDR stands for high dynamic range. Apple has used the name since 2018 (iPhone XS).
- **Deep Fusion** came with the iPhone 11 in 2019. In medium and low light, it merges several frames pixel by pixel to keep fine texture and lower noise. Apple doesn't show it on screen.
- **Photonic Engine** came with the iPhone 14 in 2022. Apple says it runs Deep Fusion earlier, before the image is compressed, for better photos in

medium and low light.

- **Night mode** also came with the iPhone 11. It turns on by itself in low light. A yellow moon icon shows how many seconds it will take. You hold the phone still while it takes frames, and it merges them into one brighter, cleaner photo.
- **Photographic Styles** are the iPhone's own color and tone choices for the Camera app. They work only when you shoot HEIF. On iPhone 16 and later, they have a **Tone** setting, and you can change a photo's Style later in Photos.

An iPhone camera setting, **Prioritize Faster Shooting**, lets the iPhone do less processing when you press the shutter many times quickly. It doesn't turn the processing off.

Apple's Camera app doesn't shoot plain RAW, which is one frame straight from the sensor. Other camera apps, like Chobial, do.

Google's Pixel phones merge a fast burst of frames too. Google calls this HDR+, and its low-light version Night Sight. Samsung and other phone makers merge frames too, under their own names.

Who the phone's processing is for

All this is clever engineering, and for most photos it's the right choice. The phone's finished photo (HEIF) is small, looks good on a phone screen straight away, and is ready to share. It's great for snapshots you send as they are. It's also the better choice for night scenes that must look clean, and for scenes with very bright and very dark parts. That's Le Gray's problem at Sète.

The cost is that the phone makes the same choices for every photo. Those choices are already inside the finished file. You can't take the noise reduction out later. And you can't bring back a highlight the phone already let go to white.

Why phone photos can look like paintings

Zoom into a phone photo of a tree taken in low light. You may see no grain and no fine detail in the leaves, only patches of flat color with sharp, bright edges between them. It looks like a painting. Some people call it a watercolor look.

I wanted to know where this look comes from, and I found four causes.

Merging. Leaves in the wind, hair and water move between frames. The phone keeps the parts it's sure about and smooths the rest. Fine texture that moves at random is the hardest to be sure about, so it often gets smoothed away.

Noise reduction. Noise reduction can't always tell noise from real fine detail, so it removes both. What's left are smooth patches of average color.

Sharpening after that. Now the main edges left are the borders between the patches. Sharpening gives each border a light or dark line. So the patches get outlines, and the outlines look like brush strokes.

Local tone mapping. In my measurements, this was the biggest cause. I compared 21 ProRAW photos from an iPhone 17 Pro Max with photos from a Fujifilm X100VI camera. I took them side by side, in daylight and indoors. Local tone mapping made shadows up to three stops brighter. That's eight times the light. Each area got a different amount, so no single change to the whole photo could undo it. When each area gets its own lift, the photo loses its sense of depth.

The painting look is strongest in these cases:

- In low light, because more noise means more merging and more noise reduction.
- With digital zoom between the real lenses.
- On leaves, hair, grass and fabric.
- On faces in mixed light.

In good light, on the 1× main camera, most phone photos look fine.

You can make the look weaker without any app. Use the real lenses (0.5×, 1× and the telephoto) and avoid the zoom steps between them, especially at night. Give the camera more light. On iPhone 16 and later, lower **Tone** in Photographic Styles. Lowering Tone brings back some of the contrast that tone mapping removes. This works only in HEIF.

How much processing each format keeps in Chobial

Chobial shoots RAW by default. On Pro iPhones (12 Pro and later) that's ProRAW. On other iPhones it's plain RAW, on the lenses that offer it. Where a camera has no RAW, Chobial takes HEIF. Each format keeps a different amount of the phone's processing (chapter 22 has the details).

- **RAW** is one frame, straight from the sensor. Nothing is merged, so nothing that moves gets smoothed away. It has more noise, especially in dim light. At low ISO in good light, the noise is fine and even, a lot like film grain. RAW is always 12 MP in Chobial.
- **ProRAW** is Apple's RAW, on Pro iPhones. The frames are already merged, with Smart HDR, Deep Fusion and noise reduction done. Apple saves tone mapping and sharpening as settings that an app can change later. So ProRAW is clean, even in low light. But the detail the merge removed stays removed.
- **HEIF** and **JPEG** are the camera's own finished photo. The merging, noise reduction, sharpening and tone mapping are already inside. Chobial's films develop them too, with less room to change things.

Chobial's Settings has a short note about this. It says: "HEIF and JPEG are the camera's own finished photo: cleaner in the dark, less room to edit."

ProRAW, HEIF and JPEG photos taken one at a time get the camera's full merging. When you shoot quickly or hold for a burst, Chobial asks the camera for speed, so it merges less.

How Chobial develops a RAW photo

Chobial's built-in films develop RAW and ProRAW with local tone mapping turned off. The film's own tone curve decides how bright the shadows are, the same way across the whole photo.

In the built-in films, noise reduction and sharpening stay at the camera's default amount, shown as **Auto**.

You can also make your own film (chapter 28). Its **Develop** section has **Local Tone Mapping**, **Noise Reduction** and **Sharpness**. Each one is on **Auto** or set by hand. A note under them says "These apply to RAW and ProRAW photos only." A HEIF or JPEG already has the camera's own tone mapping, noise reduction and sharpening inside. Setting noise reduction and sharpness low keeps more texture. Grain (chapter 23) goes on top of what's left. It works best on a photo that wasn't smoothed first.

Chobial also keeps the original of every photo. A RAW photo keeps its RAW file (a DNG), unchanged. A HEIF or JPEG stays as it was saved. The film, your edits and your crop live in a small record next to the file. The original pixels don't change.

So you can change the film on a photo later, even a year later. The app develops it again from the original. It's like real film: the negative stays, and you can print it again in a new way.

In Chobial

1. Find the format label left of the Dynamic Island. It reads **ProRAW**, **RAW**, **HEIF** or **JPEG**.
2. Tap the label to go to the next format.
3. You can also open **Controls** and use the **Format** tile, or go to **Controls › Settings › Format**.
4. To change a photo's film later, open the photo and tap **Edit**. Then tap the **Film** tool and tap another film (chapters 24 and 26).



SCREENSHOT the format label set to RAW, left of the Dynamic Island

> **On Android:** There's no ProRAW. The formats are RAW, HEIF and JPEG. RAW is one frame from the sensor, saved as DNG. Chobial shoots it by default on phones whose camera gives RAW. HEIF and JPEG come from the phone's camera system, with its noise reduction and sharpening set to high quality. The phone's own camera app (HDR+ on a Pixel) may merge more frames than other apps get. In your own film, **Develop** has only **Temperature**, **Tint** and **Base Tone Boost**. Chobial's RAW develop on Android doesn't use tone mapping, noise reduction or sharpness settings, so the film editor doesn't show them. Android is in a closed beta.

See it

Find a tree or bush with lots of small leaves (or grass, or someone's hair), at dusk or in shade. From the same spot, take one photo with your phone's own Camera app, in HEIF. Take the second with Chobial in plain RAW, in a built-in film. On a Pro iPhone, first tap the format label until it reads RAW. Then zoom both photos in on the leaves.

The Camera app photo looks cleaner and brighter. It's evenly lit, and the leaves are smooth patches with outlines. The Chobial photo has more noise or grain and darker shadows, but the leaves keep their own texture. Neither photo is wrong. It depends on what you want.

Common mistake

You switch to plain RAW for a dark night scene that must look clean, and the photo comes out full of noise. Plain RAW is one frame, and nothing merges the noise away. You'll see heavy speckle in the dark parts.

For a night photo that must look clean, use ProRAW on a Pro iPhone, or HEIF. Then the phone merges frames for you. Keep plain RAW for good light and for texture. Chapter 21 has more about shooting at night.

There's a second trap. At night, in your phone's own camera, you zoom to a step between the real lenses. You get the painting look. Use 0.5×, 1× or the telephoto instead. Chobial's camera has no digital zoom (chapter 17).

Try it

1. Find a tree, bush or grass in shade or at dusk.
2. In Chobial, use 1×. On a Pro iPhone, tap the format label until it reads **RAW**. On other iPhones, RAW is already the default. Take a photo.
3. Tap the label until it reads **HEIF**. Take the same photo.
4. On a Pro iPhone, also take one in **ProRAW**.
5. Tap the label until it reads your usual format again.
6. Tap your latest photo in the bottom left corner to open your photos.
7. Pinch to zoom in on the leaves in each photo. Look for texture, noise and outlines.

21. What a phone can't do

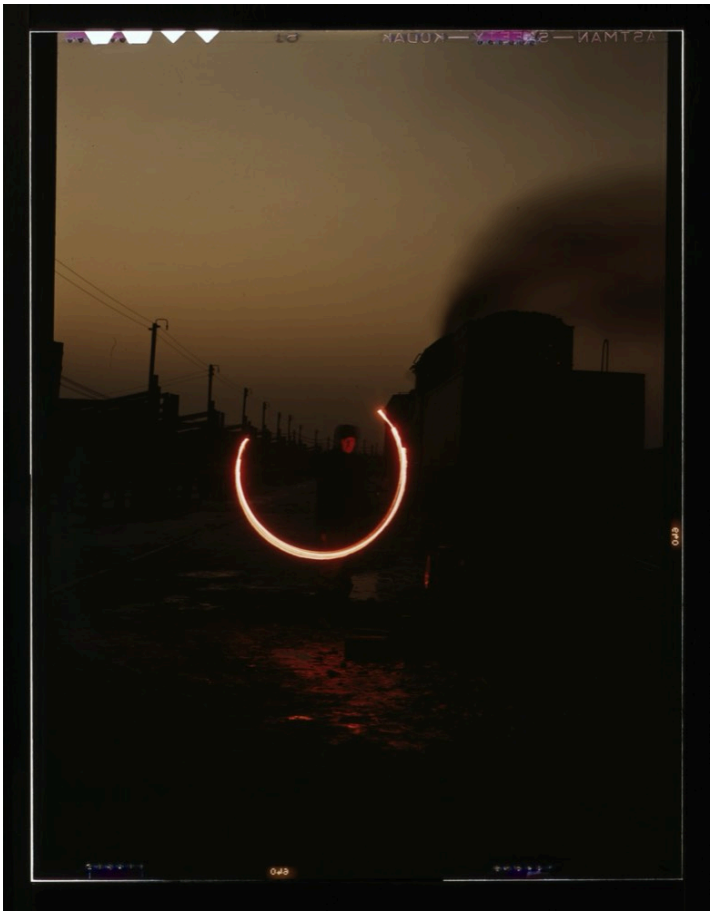


PHOTO Jack Delano, *Indiana Harbor Belt Railroad switchman signaling "stop", Calumet City, Illinois*, January 1943. Library of Congress, Prints and Photographs Division, FSA/OWI Collection.

A railroad worker stands on the tracks at dusk, signaling "stop". His face glows red-orange from a burning fusee. A fusee is a railroad flare, a stick that burns with a bright red light. Its light has drawn a glowing orange ring around him, open at the top. A dark locomotive smokes on the right.

Delano shot this on Kodachrome (chapter 10, where you saw his lantern trails). It was very slow film, about ISO 10, and it was dusk. He couldn't change the ISO, so a long time was the only way to get enough light. The flare moved while the shutter was open, and drew the ring. So the slow film is the reason the ring is there. Your phone has its own limits, and here's how to work with them.

A small sensor needs light

A full-frame sensor is 36 × 24 mm, the size of one frame of 35mm film (chapter 11). Many big cameras have one.

The iPhone 17 Pro Max main lens is called 24mm in full-frame terms, but it's really about 6.8 mm (chapter 11). So its sensor is about 10 × 7 mm, the size of a fingernail. Its area is about 12 times smaller than full-frame. With the same framing and f-number, it collects about 12 times less light. That's about three and a half stops. It's why phones show noise sooner (chapter 10). The 1× camera has the biggest sensor, so it's the best one in dim light (chapter 17).

The phone helps by merging many frames (chapter 20). In Chobial, ProRAW (on Pro iPhones) and HEIF get that merging, so they're cleaner in the dark. Plain RAW is one frame, noisier in the dark, with natural texture in good light.

To work with it:

- **Give it light.** Move toward a street lamp, a window or a lit shop front (chapter 7). In good light, the small sensor is very good.
- **Use 1× when the light is low.**
- **Let grain be part of the look.** Black and white hides color noise (chapter 10). Chobial's **Mono** films are free. So are **Press** and **Night**, which add grain of their own.

The small sensor is also why your camera fits in your pocket and is always with you. And I find people notice a phone less than a big camera.

The aperture never changes

Your phone's aperture is fixed: ƒ1.8 on the iPhone 17 Pro Max main camera, ƒ1.6 on the iPhone Duo. So Chobial doesn't show it as a setting, only in a photo's details.

With a tiny sensor, ƒ1.8 gives about the depth of field of f/6.3 on a full-frame camera. At normal distances almost everything is sharp (chapter 11). That's great for streets, buildings, food from above and groups of people.

For a soft background, get close, put the background far behind, or use 2× or the telephoto (chapter 11). Chobial has no Portrait mode. Blur from real distance looks natural, even at the edges of hair and glasses.

And since the aperture can't change, a phone's exposure triangle is a line: shutter and ISO (chapter 12).

Two good ways to shoot in low light

In the dark, you choose between a longer shutter and a higher ISO.

Way 1: hold the phone. Raise the ISO and keep the shutter at about 1/30 s or faster (chapter 12). Grainy and sharp beats clean and blurry (chapter 10). Use this when people or cars move.

Way 2: rest the phone on something. A wall, a railing, a bag or a tripod works (chapter 18). Use the lowest ISO, a long shutter and the 3-second timer. You get the cleanest photo, like Delano's. Moving lights turn into trails, so use it when nothing important moves. Stabilization helps with hand shake, but it can't stop a moving subject from blurring.

Or leave both on Auto in ProRAW or HEIF, and let the phone merge frames (chapter 20).

Things that are far away

The telephoto is 3×, 4× or 5×, depending on the model, plus an 8× sensor crop on the iPhone 17 Pro and 17 Pro Max. Chobial has no digital zoom (chapter 17). The telephoto gets less light, so it gets noisy sooner in dim light. The small LED flash lights only the nearest things (chapter 16).

So walk closer. The best zoom is your feet. Or show the far thing small, like a singer on a big stage (chapter 5). Use the telephoto in good light. In the dark, use 1× and show the whole scene.

In Chobial

The exposure line under the Dynamic Island shows ISO, shutter and EV. Values the camera picks are gray, and a value you set turns orange. A value turns red when the camera can't reach the brightness the meter wants.

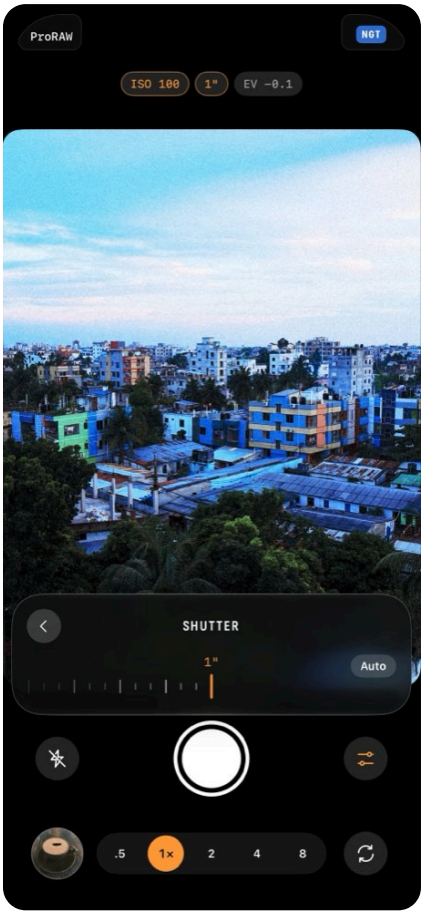
Way 1, hand-held:

1. Tap the ISO value in the exposure line, or tap **Controls**, then **ISO**. A dial opens across the bottom.
2. Slide to a high ISO, like 1600 or 3200.
3. The camera still sets the shutter, and it won't go slower than 1/8 s. If the shutter turns red, raise the ISO more.
4. Hold the phone with two hands, elbows in (chapter 18), and shoot.

Way 2, resting:

1. Rest the phone on something steady.
2. Tap **Controls**, then tap **Timer** until it shows **3s**.
3. Tap ISO and slide to the lowest value.
4. Tap ‹, tap **Shutter**, and slide to a long time. Times of 0.3 s and longer show like 0.5". The longest time depends on your phone and lens. Set by hand, the shutter can go past 1/8 s.

5. The gray EV shows how far you are from what the meter would pick. Aim for about ±0, or a bit below to keep the lights from clipping (chapter 13).
6. Press the shutter and don't touch the phone until the photo is taken.
7. Afterwards, tap **Back to Auto** in the Controls panel.



SCREENSHOT the shutter dial open at night, with ISO and shutter in orange and the timer set to 3s

To check, tap your latest photo and **swipe up**. An ISO you set shows an "M", like "ISO 3200 M".

> **On Android:** The **ISO** and **Shutter** tiles only show on lenses that let apps set them. There's no ProRAW. RAW is one frame, saved as DNG. A foldable in tabletop mode makes a good stand for Way 2. Android is in a closed beta.

See it

Find a lit street at dusk with something still in it, like a lamp post or a parked bike. Shoot it both ways. First, hold the phone in your hand at a high ISO and about 1/30 s. The photo is sharp, with grain in the dark sky. Then rest the phone on a wall at the lowest ISO with a long shutter. The photo is clean and smooth, and a passing car becomes a streak of light.

The two photos below are two different streets, shot by other photographers. They show the two results.





PHOTO PAIR A lit old street at night, sharp, with nothing moving (night-handheld.jpg). Photo: Jan Kopřiva, Unsplash, Unsplash License. / A busy road at night with a long shutter, where the passing cars became streaks of light (light-trails.jpg). Photo: Samadrita Deb, Unsplash, Unsplash License.

Both are good. They suit different scenes.

Common mistake

You push EV up until the night sky turns gray. The photo comes out noisy and flat, and the street lamps clip to white blobs. With Zebras on, every lamp is covered in stripes. Let night be dark. Expose for the lights (chapter 13) and keep the shadows black. Brightening a dark photo brings up the noise too (chapter 10).

Try it

1. At blue hour or after dark, take one lit scene with Way 1.
2. Take it again with Way 2.
3. Tap **Back to Auto**, and tap the format label until it reads **ProRAW** (Pro iPhones) or **HEIF**. Take it a third time.
4. Swipe up on each photo and pinch into the sky and the lights. Pick your favorite and remember why.
5. Set the format back and tap **Back to Auto**.

22. File formats

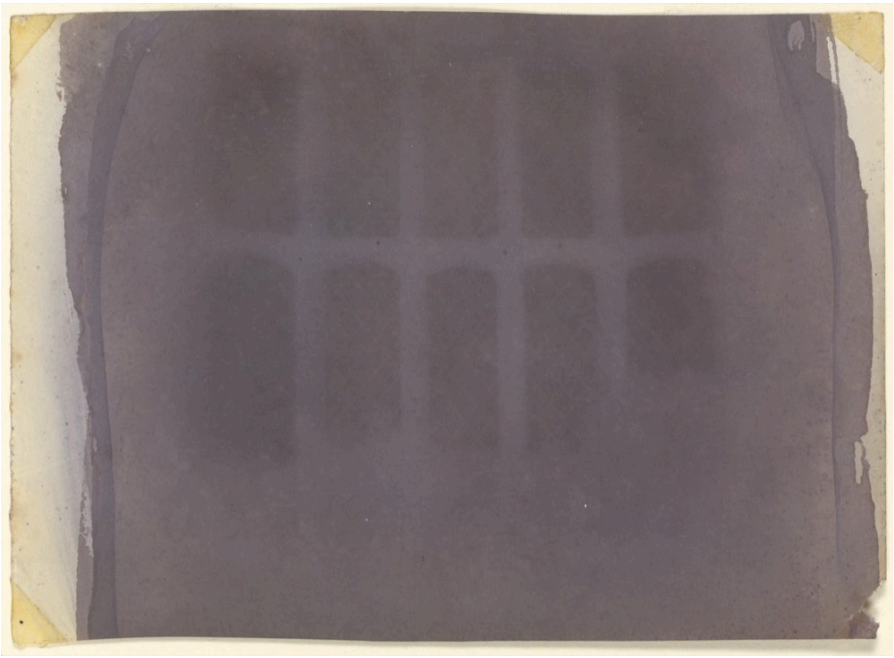


PHOTO William Henry Fox Talbot, *The Oriel Window, South Gallery, Lacock Abbey*, probably 1835. The Metropolitan Museum of Art.

This is a window in the south gallery of Lacock Abbey, Talbot's home in England. An oriel window is a window that sticks out from the wall, with its own small bay. Talbot made this photo on a sheet of paper made sensitive to light with silver salts. The sheet is small, about 8.5 × 11.6 cm, and trimmed by hand. It's one of the first photographic negatives ever made.

Look at the light. The bright sky through the window comes out dark, and the dark window frame comes out light. In a negative, light and dark are the other way round. A negative isn't the finished picture. It's the material you

make pictures from. To make a print, you lay the negative on a second sheet of light-sensitive paper and put it in the light. Light and dark flip back. From one negative you can make many prints.

Your phone saves photos in the same two ways. A RAW file is a digital negative. A JPEG or HEIF is a print. This chapter is about which one to keep, and what each one costs you.

The print and the negative

A file format is the way a photo's data is stored in a file. JPEG is the most common photo file. Any phone, computer or website opens it. HEIF stands for High Efficiency Image Format, and its files end in .heic. The iPhone's own Camera app saves photos in HEIF by default. That's the "High Efficiency" choice in the iPhone's camera settings. A HEIF is often about half the size of a JPEG of similar quality.

JPEG and HEIF are finished pictures. The phone has already done the merging, noise reduction, sharpening, tone mapping, white balance and colors. Those choices are inside the pixels now. The files are small, and JPEG opens everywhere. HEIF opens almost everywhere.

To stay small, both use compression. Compression means making a file smaller. JPEG and HEIF throw away fine detail and color steps your eye hardly notices. That's called lossy compression, because what's thrown away doesn't come back.

You can still edit a finished file, but you have less room. A highlight that went to pure white stays white. Noise reduction can't be taken out. And each time you edit a JPEG and save it again, it loses a little more.

There's also the number of steps. A JPEG stores 256 steps of brightness for each color. People call that 8 bits. ProRAW stores 4,096 steps, which is 12 bits. More steps means you can brighten or darken a lot before a smooth area like the sky breaks into bands.

A RAW file holds the sensor's readings, with no white balance, color look or tone curve added. It isn't a picture yet. Developing a RAW means turning the sensor's data into a picture: white balance, colors, brightness curve, noise reduction and sharpening. Apps show you a RAW by developing it, often from a small preview inside the file.

The data stays the same each time you develop it. So you can develop it again in a different way, even years later. A digital negative is a RAW file treated like a film negative: you keep it, and you develop it again whenever you like. That's Talbot's negative and its many prints, on your phone.

Three kinds of file on your phone

Most sensors have a pattern of tiny red, green and blue filters over the pixels. This pattern is called a Bayer mosaic. Each pixel records only one of the three colors. Demosaicing is the step that works out the full color of every pixel from its neighbors. It's part of developing a RAW.

DNG is short for Digital Negative. It's an open RAW file format made by Adobe. iPhone RAW and ProRAW are DNG files, and so is RAW from Android phones.

Here are the three kinds side by side.

- **HEIF and JPEG:** a finished picture. Small. All of the phone's processing is inside. Good for snapshots, sharing, and night scenes that must look clean.
- **ProRAW:** only on the iPhone 12 Pro and later Pro models. It's a DNG with several frames already merged and noise reduced, and the mosaic already filled in. Tone mapping and sharpening are saved as settings an app can change. Apple says it has up to 14 stops of dynamic range. It stays clean even in low light. It's a good default for most RAW shooting on a Pro iPhone.
- **Plain RAW:** a DNG with one frame, the mosaic kept, and nothing merged. It has more noise in dim light. But at low ISO in good light, the noise is

fine and even, like film grain. Leaves, hair and rough surfaces keep their own texture. It's best in good light.

What RAW can't fix

RAW gives you more room, but some things aren't in the file at all.

- **Blur:** focus blur and motion blur stay. If the sensor didn't record a detail, the file doesn't have it.
- **Clipped highlights:** a highlight clipped in the RAW itself is clipped for good. A blown-out window in the RAW stays blown out.
- **Old files:** an old HEIF or JPEG can't become a negative later. You can still edit it, with less room.

How much space RAW takes

I measured seven of my own files. All of them are 12 MP photos, 3024 × 4032 pixels. I count 1 MB as 1,000,000 bytes.

- **ProRAW, iPhone 17 Pro Max, 24mm main camera:** a latte at ISO 200 was 15.7 MB. A cappuccino at ISO 800 was 13.0 MB.
- **Plain RAW, iPhone Duo, 26mm lens:** a red hibiscus flower at ISO 125 was 10.6 MB. Boats at ISO 64 were 11.5 MB. A bicycle at ISO 50 was 11.6 MB. A seesaw at ISO 50 was 12.0 MB. A car front at ISO 32 was 12.9 MB.

So my 12 MP RAW files were about 11 to 16 MB each. In total, that's about:

- 10 photos: 110 to 160 MB.
- 36 photos: 0.4 to 0.6 GB.
- 100 photos: 1.1 to 1.6 GB.
- 1,000 photos: 11 to 16 GB.

Size changes with the scene. More fine detail and more noise make bigger files. ISO alone doesn't decide it. My cappuccino at ISO 800 is smaller than my latte at ISO 200. And my biggest plain RAW was the car front, at the

lowest ISO. Seven files is a small number, so treat these as a rough guide. Your phone and your scenes will give different numbers.

HEIF and JPEG files are much smaller than RAW. Their size depends on the phone and on Photo Size.

> **TABLE** measured file sizes — to fill

Photo Size matters too (chapter 17). Plain RAW is always 12 MP. Balanced 24MP and Best Quality 48MP make ProRAW, HEIF and JPEG photos bigger. A 48 MP photo has four times the pixels of a 12 MP one, so expect much bigger files.

Is 15.7 MB a lot for one photo? I've developed that latte file in six films so far: Negative, Gold, Chrome, Tungsten, Standard, and black and white with a red filter. That's six looks from one file, so I think it's worth the space. For backups and iCloud, see chapter 32.

In Chobial

Chobial shoots RAW by default. On Pro iPhones (12 Pro and later), the default is ProRAW. On other iPhones it's plain RAW, on the lenses that offer it.

1. Find the format label left of the Dynamic Island. It reads **ProRAW**, **RAW**, **HEIF** or **JPEG**. On a phone without the Dynamic Island, the format shows in the exposure line.
2. Tap the label to go to the next format this camera has. The order is ProRAW, RAW, HEIF, JPEG, then round again. Formats the camera doesn't have are skipped.
3. Or tap **Controls**, then the **Format** tile. It shows **PRO** for ProRAW, otherwise RAW, HEIF or JPEG. Tap again for the next one.
4. Or tap **Controls**, then **Settings**, and under **Capture** pick from **Format**. The note under it says: "HEIF and JPEG are the camera's own finished

photo: cleaner in the dark, less room to edit." The **Format** tile and this setting only appear when the camera has more than one format.

5. To see a photo's format and size, open the photo. A small tag under it shows the film and the format, in capitals, like PRORAW, RAW or HEIF. Tap ⓘ or swipe up for the details. One line shows the megapixels, the size in pixels and the file size of the original.



SCREENSHOT the format label left of the Dynamic Island, reading ProRAW

Some lenses and cameras have no RAW, like some front cameras. Then Chobial takes HEIF. If HEIF is the only format that camera has, the label is a dimmer gray and tapping it does nothing. That's the camera's limit, and the shutter still works.

Plain RAW comes only from the whole sensor. On a sensor crop (2× or 8×), a Pro iPhone takes ProRAW when RAW is chosen. Other iPhones take HEIF. Your choice of RAW stays for the other lenses. **NO PHOTO** in red means the camera has nothing it can take, neither RAW nor HEIF. The shutter can't take a photo then, so try another lens. You'll rarely see it.

Every format goes through the same films, and the viewfinder shows the film whatever the format. HEIF and JPEG have less room to change things. Chobial keeps every original. A RAW photo keeps its DNG unchanged, and a HEIF or JPEG stays as saved. The film and your edits live in a small record next to it. That's why you can change the film later (chapter 24).

When you share, open a photo and tap **Export**. The **Format** tile goes JPEG (the default), HEIC, RAW. The camera label says HEIF, and the export tile says HEIC. JPEG and HEIC give you the developed picture, with the film and your edits. RAW gives you the original as it was taken. Shooting, developing and editing are free, but exporting the RAW needs Pro. Chapter 31 has more on sharing.

> **On Android:** There's no ProRAW. The formats are RAW (the default), HEIF and JPEG. RAW is one frame from the sensor, saved as a DNG, on phones whose camera gives RAW. A lens without RAW takes HEIF, or JPEG if it has no HEIF either. The label then says **NO RAW** in red, but the shutter still works. **NO PHOTO** in red means that camera can't take anything. The format sits in the "ear" left of the camera hole. Export has the same JPEG, HEIC and RAW choices, and the photo's details show the file size too. Android is in a closed beta.

See it

I shot a spider lily in plain RAW on my iPhone. As shot, the white petals look blown out, just flat white. Then I made the same RAW one stop darker in the editor, with the Light tool's Exposure. The pink and the texture came back in the petals. The detail was in the RAW all along.



PHOTO PAIR A spider lily shot in plain RAW, as shot, with washed-out white petals (lily-as-shot.jpg) / The same RAW one stop darker in the editor, with pink and texture back in the petals (lily-pulled-back.jpg)

Make your own pair. Find something bright and white, like a flower or a white shirt in the sun. Shoot it once in RAW and once in HEIF. Open each photo, tap **Edit**, then the **Light** tool, and pull **Exposure** down about one stop (–1.0). Exposure goes from –3 to +3. The RAW usually has more left in the brightest parts. See for yourself what your HEIF does.

Common mistake

The trap is shooting everything at the biggest settings without knowing the cost. On a Pro iPhone with Best Quality 48MP and ProRAW, every photo is far bigger than a 12 MP one. A day of shooting like that fills the phone fast.

You'll spot it when the phone warns you about storage. Or check a photo's file size in its details before that happens.

The fix:

- Keep Photo Size at Fast Capture 12MP for everyday shooting.
- Use 48 MP for a still, detailed scene you may print or crop (chapter 17, chapter 33).
- Switch to HEIF for snapshots you'll only send.
- Keep RAW for photos where the look matters.

Try it

1. Point at one scene with bright and dark parts, in good light.
2. Take it in each format your phone offers. Tap the format label between shots: ProRAW, RAW, HEIF, JPEG.
3. Open each photo, tap ⓘ (or swipe up), and note the file size.
4. Write the four sizes down. Now you know your own phone's numbers.
5. Set the format back to your usual one.

On Android, you'll have three: RAW, HEIF and JPEG.

PART 3

Film looks, developing and finishing

23. What makes film look like film



PHOTO Russell Lee, *Faro and Doris Caudill, homesteaders, Pie Town, New Mexico*, October 1940. Library of Congress, Prints and Photographs Division, FSA/OWI Collection.

Part 2 was about your phone's camera. Part 3 is about what happens after the shutter: the film look, developing and finishing.

You met the Caudills at their dinner table in chapter 12. Russell Lee photographed them again in October 1940, for the FSA. The title calls them homesteaders. A homesteader was a settler who got land from the US government by living on it and farming it.

This time Lee shot on Kodachrome, a slide film. The film that went through the camera became the finished picture. People looked at it with light shining through it, or projected it on a screen (chapter 24).

Look at the sky. The stormy blues are deep, and the white clouds fade softly into white. The skin is warm. No phone makes these colors by default. Soft highlights and each film's own colors are the two biggest parts of a film look.

The parts of a film look

A film look is several traits together, and most phone photos have the opposite of each one.

- **Highlights that fade slowly into white.** This is the main one.
- **Each film stock's own colors.**
- **Grain** that's part of the picture.
- **Halation**, a red-orange glow around bright lights, on some films.

Smaller ones help too. On film, dark shadows stay dark, and there are no sharpening halos along edges (chapter 20). Prints and scans often have slightly lifted blacks, called fade.

With tone and color right, I think a photo already looks like film at a glance. Grain and halation keep it looking like film up close.

Highlights that fade slowly into white

A tone curve is the rule that turns each brightness the sensor recorded into a brightness in the picture. Chapter 22 called it the brightness curve.

Film moves into its brightest tones slowly. Skies and the bright parts of skin keep some color and some shape. This soft fade into white is called highlight roll-off. The top part of the tone curve, where it bends, is called the shoulder.

Digital files tend to clip hard into flat white patches. Phones also pull bright parts down so far that they can look gray (chapter 20).

To me, the soft shoulder is the surest single sign of film. It's also how I spot a bad film look. In a bad one, bright areas turn into flat white with a color tint on top.

Each film stock's own colors

A film stock is one kind of film sold under one name, like Kodak Portra 400 or Fujichrome Velvia 50. Each stock shifts colors in its own way. It decides which colors shift, which ones it holds back, and how strong each one ends up.

Warm consumer negatives have olive greens. Cool slide films have deep blues. Soft portrait films have muted greens. A saturation slider can't copy this, because each color needs its own shift.

My own rough rule is that Kodak films often lean warm, and Fujifilm films are known for their greens. There are exceptions. In Chobial, **Tungsten** is modeled on a Kodak film, and it's cool. **Gold**, modeled on Kodak Gold, has "golden warmth, punchy yellows and olive greens."

Grain that's part of the picture

You met grain in chapter 10. Digital grain looks fake when it's one even layer of gray noise on top of the picture, with the same strength in every tone.

Real grain is strongest in the midtones and fades toward pure black and pure white. On color film, grain has a little color. Color film has three layers, for red, green and blue, and their grain doesn't line up. Grain forms small soft spots, not single sharp pixels. It should go on last, after the colors and your edits, so sharpening and noise reduction can't touch it.

I think of grain as the salt of a film photo. With the right amount, nobody notices it. If the grain is the first thing you notice, you've salted the plate instead of the food.

So use less than you think. Bright daylight wants fine grain. Night and dark rooms can take more, because that's when film photographers loaded fast film.

Halation: the red glow around bright lights

Halation is the red-orange glow around bright lights on film, like a street lamp at night. The word comes from "halo".

Film is a stack of thin light-sensitive layers on a clear plastic base. These layers are called the emulsion. Very bright light gets all the way through into the base. At the back of the base, some of it is reflected back up at an angle. It exposes the film a second time from behind, a little to the side. That's the halo. So the glow is a soft ring around the light, and the light itself is usually pure white.

The glow is red because the red-sensitive layer is closest to the base. Also, the light that gets that far is mostly red. Blue and green are mostly used up in the layers above. Very strong lights reach the green layer too, so a heavy halo looks orange inside. Black-and-white film has one kind of emulsion, so its halation is a plain white glow.

For most of photography's history, halation was a fault, because it softens detail around bright edges. So film makers add an anti-halation layer that takes in the light before it can bounce back. Processing removes it.

Only bright light glows. A face in ordinary light or a white shirt in daylight doesn't. If a face or a shirt glows red, the effect is too strong.

Bloom is a different effect. It's a white glow from the lens or a diffusion filter, with light of every color spreading.

Filter, preset and film emulation

A filter is a fixed effect that changes every photo the same way. Most filters work on a finished JPEG or HEIF, so they can't bring back detail in a bright sky.

A preset is a saved set of slider moves, like exposure +0.3, contrast –10 and some grain. It moves the sliders from wherever your photo is. So on a brighter or warmer photo, it lands somewhere else.

Film emulation copies how a real film behaves: its tones, how bright areas fade into white and how each color shifts. It adds grain that changes with brightness, and halation on some films. Fujifilm calls its version a film simulation (chapter 29). Film emulation works best on RAW, because the RAW still has the scene's whole range of light.

In Chobial

Chobial has 46 films: 35 color and 11 black and white. You can load, see, shoot and develop in every film for free. 22 are free to save, and saving in the other films needs Pro. Each film has a three-letter badge to the right of the Dynamic Island, like STD for **Standard**, the film a fresh install starts on.

Twenty-four films are my own looks, mostly measured from two Fujifilm cameras, an X-T30 III and an X100VI. The other 22 were worked out from the data sheets Kodak and Fujifilm published. Two films lean on Kodachrome. **Heritage** is modeled on Kodachrome 64, and **Postcard** on Kodachrome-era slide color. Chobial is not connected to Kodak or Fujifilm.

Chobial's films are built on a tone curve with a soft shoulder, so the brightest tones bend gently toward white. Bright, strong colors are also eased toward white as they get brighter. In an early version of Chobial, a sunlit red flower turned salmon, then pink. Now it keeps its red and its shading. A film can't bring back detail the sensor clipped, though. What's pure white in the RAW stays white (chapter 13).

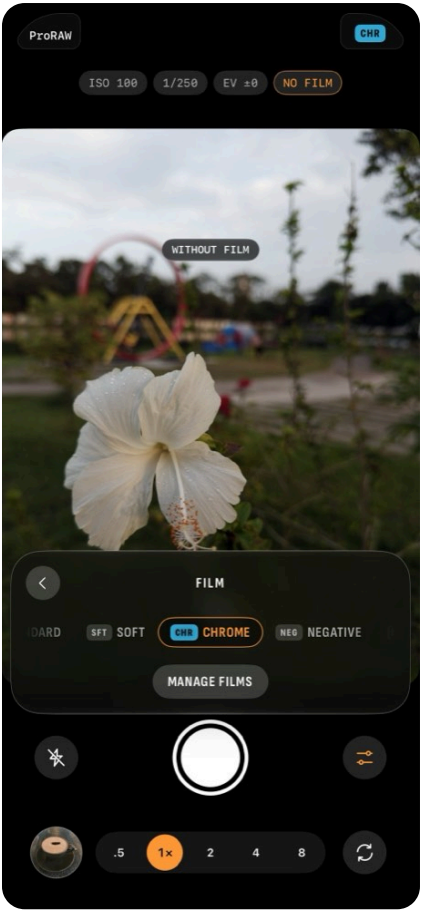
Not every film has grain. **Press** has gritty grain, and **Standard** has none, apart from the little grain every film gets at ISO 2000 and up (chapter 10). Chobial's grain follows tone, like real grain. It goes on after the film's tone and color, so your edits don't sharpen it. In the viewfinder, it moves from frame to frame, like film.

Tungsten is the film with halation built in. The real Kodak Vision3 500T has a backing that stops this glow. I added the glow on purpose, because the glow is what people shoot tungsten film for. Only the brightest pixels glow, and

the white light itself stays white.

Live Film is on by default. It shows the viewfinder through the loaded film, with its colors, moving grain and halation glow.

1. Tap **Controls**, then **Guides**. The **Live Film** tile is orange when it's on.
2. Swipe across the picture for the next or the previous film.
3. Tap **Controls**, then **Film**, or tap the film badge. The row of film names opens.
4. Touch and hold any film's name. The film comes off, and the picture says **WITHOUT FILM**. Let go, and the film is back.
5. To change grain or halation on one photo, open it and tap **Edit**. Choose the **Film** tool and slide **Grain** or **Halation** (chapter 26).



SCREENSHOT the row of film names, one name held, WITHOUT FILM on the picture

The peek in step 4 shows what the film does to the scene. Holding the picture itself locks focus and exposure instead (chapter 19).

If you turn Live Film off, **NO FILM** shows in the exposure line. Your photos are still developed with the loaded film.

> **On Android:** Everything here works the same. Android is in a closed beta.

See it

I developed one ProRAW frame from my iPhone twice. It's a tall red steel ring with a bicycle inside it, by a lake, under a cloudy evening sky. With a clean develop, the colors are bright. In **Negative**, modeled on Fujicolor Superia, the sky turns pale and soft. The trees get darker, the red ring gets quieter, and there's more contrast.





PHOTO PAIR Clean develop, no film look (ring-neutral.jpg) / The same RAW in Negative (ring-negative.jpg)

To make your own pair, hold a film's name to compare it live with the plain picture. Or develop one photo in two films later (chapter 24).

Common mistake

The trap is turning grain and halation up until they're the first thing anyone sees.

You'll spot it when faces or a white shirt glow red, or a sunny photo looks pink all over. Or you pinch to zoom, and the grain is the first thing you notice.

The fix is on that photo. Tap **Edit**, choose the **Film** tool, and lower **Halation** or **Grain** (chapter 26). Keep strong halation for night scenes with small bright lights against dark areas. Daylight and slide-film looks want fine grain.

Try it

Go out at dusk or at night. Find a small bright light against a dark area, like a street lamp or a lit sign.

1. Tap **Controls**, then **Guides**, and check that **Live Film** is orange.
2. Swipe through four or five films, including **Tungsten** and **Standard**. Watch the light and the sky change.
3. Tap **Controls**, then **Film**, and hold a film's name to see the scene WITHOUT FILM. Let go.
4. Take the same photo in two films. Tungsten is free to shoot in, but saving it out of Chobial needs Pro.
5. Open both photos and compare which light has a glow and which sky is softer. Pinch to zoom to look at the grain.

24. Choosing a film for the light



PHOTO Alfred T. Palmer, *Sunset silhouette of flying fortress, Langley Field, Va.*, July 1942. Library of Congress, Prints and Photographs Division, FSA/OWI Collection.

Alfred T. Palmer took this photo at an airfield in July 1942, for the US government during the Second World War. A low sun sits in a hazy sky, and the whole sky glows amber, an orange-yellow, with streaks of cloud. A B-17 bomber, nicknamed the Flying Fortress, is a dark silhouette on the left. To its right, a small group of men sit on the ground and one stands. They're silhouettes too, and the ground is almost black.

The color in this photo comes from two things together. The first is the light: a low, warm sun at golden hour (chapter 7). The second is the film. The photo is a Kodachrome, a slide film with deep, strong colors and dark shadows. The slide film let the shadows go black and kept the color of the sky.

A softer negative film usually keeps more detail in dark areas, and its colors are paler and softer. On an evening like this one, a negative film would likely have shown more of the ground. This chapter is about picking a film that suits the light in front of you.

Kinds of film and when people used them

Film photographers used three main kinds of film: color slide, color negative and black and white. They picked one before going out and loaded it for the whole roll.

Slide film is the kind you met in chapter 23. Kodachrome, Ektachrome, Velvia and Provia are slide films. They give deep, strong colors, high contrast and dark shadows.

Exposure latitude, or just "latitude", is how far from the right exposure a film can be and still give a good picture. Slide film has narrow latitude, especially when it gets too much light. Overexposed highlights turn pure white with no detail. That's why slide shooters exposed for the highlights.

Color negative film, also called print film, is film where the colors come out reversed on an orange-tinted negative. The picture is then printed on paper. It's what most people shot for snapshots. Kodak Portra, Kodak Gold and Fujicolor Superia are examples. They have softer contrast, gentler highlights and warm, flattering skin.

Color negative film has wide latitude, especially toward too much light. It copes well with being overexposed and badly with being underexposed. Film shooters said, "It would rather be a little bright than a little dark."

Black-and-white film, like Kodak Tri-X, turns colors into shades of gray, so the picture is about light, shape and texture (chapter 25).

Fast film, with a higher ISO like 800 or 1600, was for dim light, and it had bigger grain. Slow film, at ISO 50 or 100, was for bright light and fine detail.

Daylight film, tungsten film and movie film

Color film is made for one color of light. Daylight film is made for sunlight, about 5500 K. Tungsten film is made for tungsten lamps, about 3200 K.

In Kodak Vision3 250D, the D means daylight. In Kodak Vision3 500T, the T means tungsten. If you shoot daylight film under lamps, the picture comes out orange. If you shoot tungsten film in daylight, it comes out blue.

Both are motion picture films. Motion picture film is film made for shooting movies. It's flatter and quieter in color, with lots of shadow detail, because movie colorists finish the look later.

How Chobial sorts its films

Chobial has 46 films: 35 color and 11 black and white. Each one was made to look like a real film stock, a camera's film simulation or a camera look. Chobial is not connected to Kodak or Fujifilm.

The Films list has four headings. **Color** is clean, everyday color. **Color Negative** is print film, with soft highlights and warm skin. **Slide** has deep, strong colors, like Saturated and Postcard. And then there's **Black & White**.

Every film loads, previews, shoots and develops for free. 22 films are also free to save. Saving a photo out of the app in the other 24 needs Pro, and a small lock marks them. No Film, which shows the photo with no film look, is free too, but it isn't one of the 46.

The 22 free films are Standard, Soft, Chrome, Portrait, Wedding, Holiday, Eighties, Aerial, Snapshot, Cool, Night, Daylight, Projection, Landscape, Clear and Bleach in color. In black and white, they're Mono, Mono + Ye, Mono + R,

Mono + G, Sepia and Press.

Each built-in film has a **Suits** line on its film card, naming the light it's made for. Here's a rough guide built from those lines:

- **Bright sun and clear skies:** Clear, Holiday and Daylight (free), plus Negative, Expedition, Heritage, Saturated and Gold.
- **Low sun, golden hour, sunrise and sunset:** Landscape (free), plus Nostalgia and Gold.
- **Overcast days:** Cool, Chrome and Projection (free), plus Everyday.
- **Soft light, open shade, windows and faces:** Soft, Portrait and Wedding (free), plus Pastel and Soft Portrait.
- **Warm lamps indoors:** Eighties (free), plus Vintage.
- **Dusk, night and street lights:** Night (free), plus Cinema, Tungsten, Dusk and Noir.
- **Hard light and texture:** Bleach and Chrome (free), plus B&W.
- **Any light:** Standard, Portrait and Wedding (all free).

My own rule of thumb is to match the film to the light, or push against it on purpose. A warm film at golden hour makes warm light warmer. A cool film on a gray day keeps the gray quiet and honest. When I'm not sure, I start with **Standard**. Its Suits line is "Any light, every day".

If you know Fujifilm's film simulations, start from the same film. Provia is close to **Standard**, Astia to **Soft**, and Velvia to **Saturated** or **Landscape**. For Classic Chrome, start from **Chrome**. Chapter 29 has more on Fujifilm recipes.

A film doesn't change the camera's white balance, which has its own setting in **Controls › WB** (chapter 15). **Tungsten** adds a cool, blue lean, but it doesn't set the white balance.

Pick the film after you shoot

Film photographers chose before they went out. You can choose later.

Chobial shoots RAW by default, and every photo keeps its original. The film is how the photo is developed for now. A new film develops the photo again from the original, so it doesn't go on top of the old look. HEIF and JPEG photos take any film too, but with less room to change (chapter 22).

One RAW in two films, side by side, is the clearest way to see what a film does. I developed one ProRAW frame from my iPhone six ways. It's a tall red steel ring with a bicycle inside it, by a lake, under a cloudy evening sky. None of these looks is baked into the file.

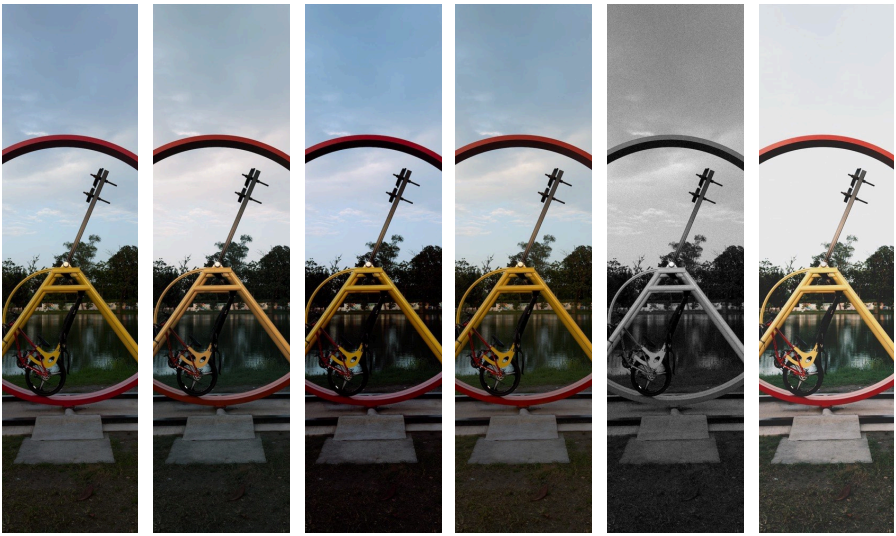


PHOTO One RAW, six films: a clean develop with no film look (ring-neutral.jpg), Negative (ring-negative.jpg), Expedition (ring-expedition.jpg), Nostalgia (ring-nostalgia.jpg), B&W + R (ring-bw-red.jpg), and Negative made over a stop brighter with a faded curve (ring-faded.jpg)

In Chobial

See what a film suits:

1. Swipe across the viewfinder to load the next or previous film. Its name and a short description show for about a second. The description says what the film is like, but not the light it suits.

2. For that, tap **Controls**, then **Film**, then **Manage Films** under the row of films.
3. In the **Films** list, tap ⓘ next to a built-in film. The film card shows the film's name, its description, the **Suits** line, and how much **Grain**, **Halation** and **Bloom** it has.



SCREENSHOT a film card with the Suits line

Change the film on one photo:

1. Tap the last photo in the bottom corner of the camera, then tap a photo in the library.
2. Tap **Edit**.
3. Choose the **Film** tool. A row of film badges opens. The loaded film is in an orange well.
4. Slide the row and tap a film. The photo develops again from its original. Your other edits stay.
5. **Strength**, in the strip under the films, turns the film down toward a plain develop. It starts at 100%.
6. Tap **Compare** for a before-and-after slider, or touch and hold it to see the photo before any edits. Touch and hold the **Film** tool's tab to see the photo without the film.

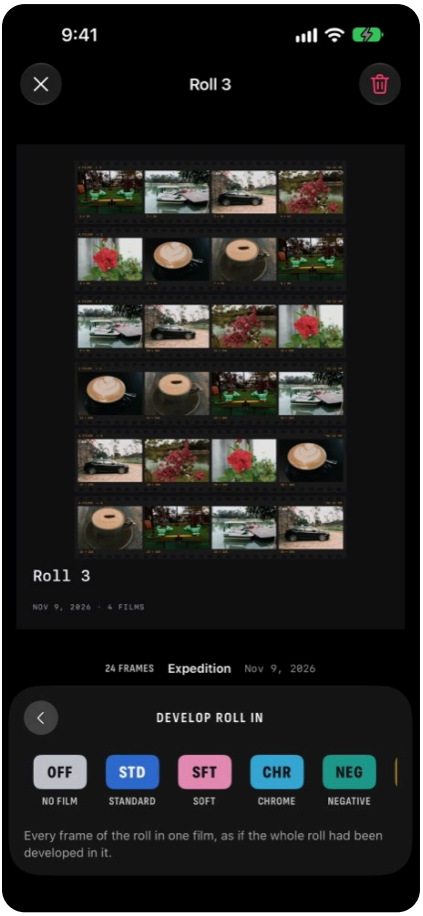
One photo has one film at a time. To keep a copy in one film, tap **Export**, then **Save to Photos**, and then pick the next film. Saving in a film with a lock needs Pro. The rest of the editor is in chapter 26.

Develop a whole roll in one film:

A roll in Chobial is a set number of frames, 24 or 36, that you shoot like a roll of film. Rolls are off unless you turn them on.

1. Tap the **Rolls** tile in **Controls** until it says **24** or **36**, or choose it in **Settings › Rolls**.
2. When the roll is finished, your latest photo says **ROLL DONE**. The library's **Rolls** album shows the roll's contact sheet. A contact sheet is one page with every frame of a roll on it, in rows. Labs printed one from each developed roll.
3. On the contact sheet, tap **Develop Roll In…** to open a row of films.
4. Tap a film. Chobial asks, for example, "Develop all 24 frames in Cool?" Each frame keeps its RAW and its edits.
5. Tap **Develop 24 Frames**. When it's done, it says "Developed in Cool", with **Undo** next to it. Undo puts each frame back in the film it had before, until

you leave the contact sheet.



SCREENSHOT the contact sheet with the Develop Roll In… row of films open

It's like a lab developing a whole roll one way, with a film you pick for that day's light. Chapter 45 has more on rolls.

> **On Android:** Everything here works the same, including the film card (the **i** button in the Films list). Android is in a closed beta.

See it

I took one RAW frame with my iPhone Duo on an overcast day (26mm, f/1.6, 1/430 s, ISO 50). A black car is parked on a brick-paved lot under trees, with a small Ferris wheel behind. Pink-red bougainvillea flowers grow on a trellis on the left. The sky is flat white-gray.

On the left is **Chrome**, which suits "Street and documentary, overcast or hard sun". The colors stay quiet and a little cool. The flowers stay pink-magenta, and the grass is muted.

On the right is **Negative**, which suits "Bright days and snapshots". The picture turns warmer and a bit browner. The flowers go orange-red, and the brick turns more red.



PHOTO PAIR Chrome on a gray day (car-park-chrome.jpg) / The same RAW in Negative (car-park-negative.jpg)

On a gray day, I'd keep Chrome, because it was made for that light. Negative wants a bright day.

Common mistake

The trap is using one favorite film for everything, and then wondering why some photos look wrong.

You'll spot it by the light. A warm negative on a gray day goes muddy brown. A hard slide film in harsh noon sun loses the shadows to black. A night film's heavy grain looks out of place on a bright beach.

The fix is to look at the light first. Then check the film's **Suits** line, or try two films on the photo in the editor. If the film is right but too strong, turn down **Strength**.

Try it

1. Take one photo in RAW. Look at the light: sun, clouds, shade or lamps.
2. Open the photo, tap **Edit** and choose the **Film** tool.
3. Try three films. Pick one whose Suits line matches the light, one that fights the light, and **Standard**.
4. Tap **Compare** on each one.
5. Pick one film. Say why in one sentence about the light, out loud or in a note.

If you want more, shoot a 24-frame roll on one day. Then use **Develop Roll In…** to try the whole roll in a film made for that day's light.

25. Black and white



PHOTO Ansel Adams, *Mountain Tops, Low Horizon, Dramatic Clouded Sky, "In Rocky Mountain National Park," Colorado*, 1941–42. National Archives, Ansel Adams Photographs of National Parks and Monuments (Mural Project).

It's Ansel Adams again, from the same project as chapter 13. The horizon is very low, and the sky fills about four fifths of the frame. At the top left, the sky between the clouds is almost black. Big white clouds pile up across the middle. On the left, a dark gray storm cloud hangs low. What looks like a gray curtain of rain falls from it. In the front, a dark, rounded mountain top is dotted with snow.

That sky was blue. In a black-and-white photo, the blue turns into a shade of gray, and the photographer decides how dark that gray gets. The film, the exposure and often a color filter on the lens decide it. Here the sky behind the clouds is so dark that the white clouds jump out.

Seeing in tones

Tones are the steps of brightness in a black-and-white photo, from black through grays to white. Seeing in tones means looking at how bright things are instead of what color they are. You'll also see the word monochrome. It means one color, and in photography it means black and white.

Black-and-white film records only how much light came from each part of the scene (chapter 1). So the photo is about light, shape, texture and contrast.

Two colors that look very different can have the same brightness. A red apple and green leaves can turn into the same gray, and so can a red door next to a green one. Then they melt together in the photo. So look for differences in brightness: light against dark, a bright face against a shadow, texture lit from the side, or a strong shape.

My favorite trick is to squint at the scene. With your eyes half closed, the colors fade and you mostly see light and dark. You'll look a bit odd on the street, but it works.

With a black-and-white film loaded in Chobial, the viewfinder shows you the tones before you shoot (chapter 6).

In black and white, clipped highlights stand out as flat white patches even more than in color. Expose for the highlights (chapter 13) so white clouds keep their detail.

How color filters change the grays

In chapter 23, a filter was a software effect, like an Instagram filter. Here it means something else. A color filter is a piece of colored glass that screws onto the front of the lens.

Black-and-white film sees more blue than your eye does. So a blue sky often comes out pale, almost white, and white clouds barely show against it. For about a century, photographers fixed this with a color filter.

A filter lets light of its own color through and holds back the opposite colors (its complementary colors, chapter 6). Whatever it holds back reaches the film less, so it comes out darker in the print. Things in the filter's own color come out lighter.

- **Yellow** is the mildest. It holds back some blue, so a blue sky gets a little darker and the clouds stand apart from it. Skin and leaves stay close to normal. Many photographers kept a yellow filter on for everyday landscapes and streets.
- **Red** is the strongest. It holds back blue and green. A blue sky goes dark, sometimes almost black, and white clouds stand out bright. Leaves and grass go darker. Red things and skin go lighter, so skin can look pale and smooth.
- **Green** lightens leaves and grass, so you can see more difference between plants. It darkens reds, like red flowers, red cars and lips.

A dark sky behind white clouds, like the one in the Adams photo, is the look photographers got with a yellow or red filter. We don't know which filter, if any, Adams used for this photo. But Adams later wrote about his 1927 photo *Monolith, the Face of Half Dome*, in Yosemite. He said he switched to a deep red filter to make the sky go almost black.

A glass filter holds part of the light back, so photographers had to give more exposure. That was roughly one stop more for yellow, two for green and three for red. And the filter was fixed when you pressed the shutter.

A filter only works on colors. A white or gray overcast sky has no blue for a red filter to darken, so it stays pale. Filters do the most on a deep blue sky with white clouds.

Chobial's black-and-white films

Chobial has 11 black-and-white films, under the **Black & White** heading in the Films list. Six are free to save: Mono, Mono + Ye, Mono + R, Mono + G, Sepia and Press. The others need Pro to save, and a small lock marks them.

In the names, "Ye" means yellow, "R" means red and "G" means green. Two families have the same filters, measured from a real camera:

- **Mono**, **Mono + Ye**, **Mono + R** and **Mono + G** are clean black and white, with an even tone and no grain. All four are free.
- **B&W**, **B&W + Ye**, **B&W + R** and **B&W + G** are modeled on Fuji Neopan Acros 100, a fine-grained black-and-white film. They have deeper blacks and fine grain. All four are Pro.

Three more films have no filter in the name:

- **Sepia** is Mono with a warm brown color over the whole picture. Sepia toning is a chemical bath for a finished black-and-white print that turns its grays warm brown. Sepia is free.
- **Press** is modeled on Kodak Tri-X 400, a classic film of news photographers. It has open shadows, bright skies and coarse grain. It has no color filter, so it sees blue strongly. It's free.
- **Noir** is modeled on Eastman Double-X 5222, a black-and-white motion picture film. It has bright skies, dark leaves, deep shadows and fine grain. It's Pro.

In software, a black-and-white film mixes the red, green and blue parts of each pixel into one gray. A filter changes how much each color counts in that mix. A red filter makes red count more and blue count less.

Software filters cost no light, so you don't need extra exposure. You can also change the filter after you shoot. Chobial shoots RAW by default, and every photo keeps its original. So a photo shot in Mono + R can be developed again in Mono + G or plain Mono, any time.

In Chobial

Load a black-and-white film in the camera:

1. Swipe across the viewfinder to load the next or previous film. Or tap the film's badge to the right of the Dynamic Island and slide the row of films. The film in the middle loads when the row stops.
2. With Live Film on, the viewfinder turns black and white.

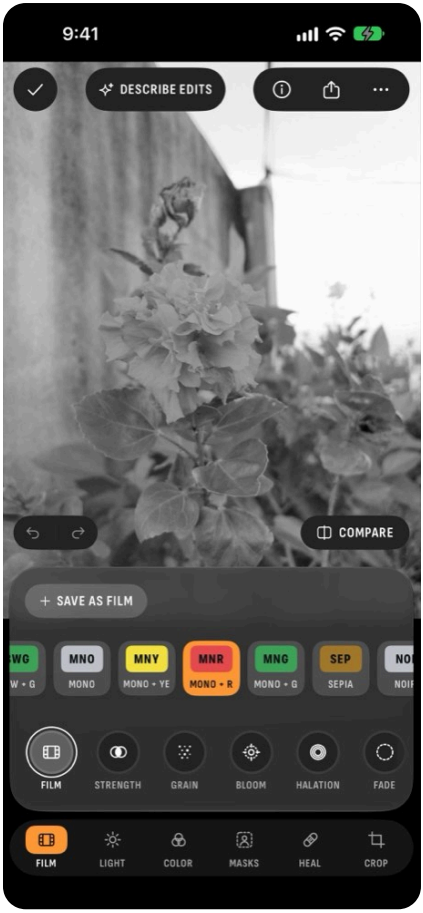


SCREENSHOT the camera with Mono + R loaded, the MNR badge by the Dynamic Island and the viewfinder in black and white

Change the filter after you shoot:

1. Tap the last photo in the bottom corner of the camera, then tap a photo in the library.
2. Tap **Edit**.
3. Choose the **Film** tool. A row of film badges opens. The loaded film is in an orange well.

4. Slide the row and tap another film, for example **Mono + G** instead of **Mono + R**. The photo develops again from its original. Your other edits stay.
5. Tap **Compare** for a before-and-after slider. Touch and hold the **Film** tool's tab to see the photo without the film, in color.
6. **Strength**, in the strip under the films, turns the film down toward a plain black and white with no filter. The photo stays black and white. To go back to color, pick a color film.



SCREENSHOT the editor's Film tool with the black-and-white films in the row and Mono + R in the orange well

The editor's other tools are in chapter 26, and darkening only the sky is in chapter 27.

> **On Android:** Everything here works the same, with the same 11 films. Android is in a closed beta.

See it

This is the red ring from chapter 24, one ProRAW frame from my iPhone. A tall red steel ring with a bicycle inside it stands on a yellow frame by a lake. The evening sky is cloudy, with some patches of blue.

On the left is a clean develop with no film look. The ring is bright red, the frame is bright yellow, and the grass is green.

On the right is the same RAW in **B&W + R**. The red ring comes out light gray, and the yellow frame is lighter still, almost white. The patches of blue sky go darker gray, so the clouds stand out more. The grass and the trees go dark.

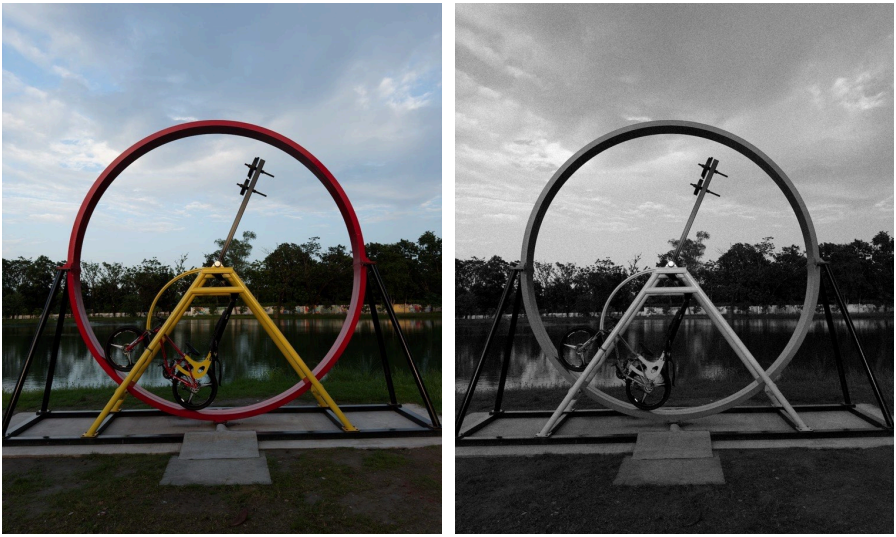


PHOTO PAIR The red ring with no film look (ring-neutral.jpg) / The same RAW in B&W + R (ring-bw-red.jpg)

Mono + R has the same red filter with no grain, and it's free.

Common mistake

The trap is expecting colors to stay apart in black and white. Two colors that look nothing alike can turn into the same gray. Then the photo goes flat, or the subject disappears.

This is the car park from chapter 24. I shot it on my iPhone Duo on an overcast day (26mm, f/1.6, 1/430 s, ISO 50). Pink-red bougainvillea flowers grow among green leaves on the left, and the sky is flat white-gray.

In **Chrome**, the flowers stand out against the leaves. In **B&W + R**, the flowers come out about the same gray as the leaves, so they almost disappear. The white sky stays pale, because it has no blue for the red filter to darken.

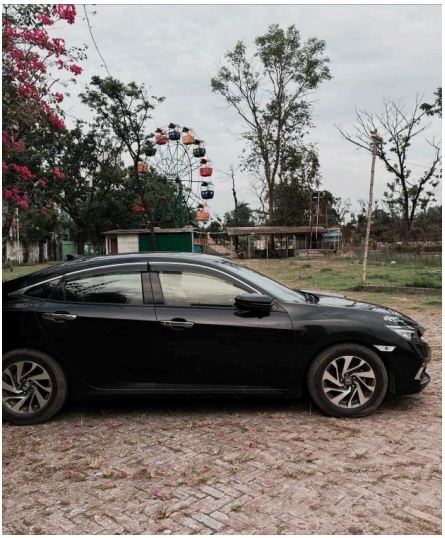




PHOTO PAIR Pink flowers in Chrome (car-park-chrome.jpg) / The same RAW in B&W + R (car-park-bw-red.jpg)

To spot it, squint, or look at the black-and-white viewfinder. If your subject is the same gray as what's around it, the subject is lost.

The fix is a filter that pulls the two colors apart. To make red flowers darker than green leaves, try **Mono + G**, which makes greens lighter and reds darker. Or move until your subject is in front of something darker or lighter.

Try it

1. Wait for a day with blue sky and white clouds. Point the camera high up and away from the sun, where the blue is deepest. Put a building or a tree in the frame too, if you can.
2. Load **Mono** and take the photo. Expose for the clouds so they keep their detail (chapter 13).
3. Open the photo, tap **Edit**, choose the **Film** tool and tap **Mono + R**. Switch between the two films a few times. Touch and hold the **Film** tool's tab to see the colors.
4. Look at the sky. How much darker did it go? Then look at the clouds, at any red things and at the leaves.
5. Try **Mono + Ye** and **Mono + G** on the same photo. Pick one film and say why in one sentence.

All four Mono films are free, so you can save the one you pick. On a gray day, try it again and see how little the red filter changes a white sky.

26. Developing a photo, step by step



PHOTO Frederick H. Evans, *Ely Cathedral, Nave, Southwest Corner*, c. 1899. The Cleveland Museum of Art.

Frederick H. Evans made this photo inside Ely Cathedral, in the east of England, around 1899. We're looking into the nave. The nave is the long main hall of a church, where people sit. The picture is very tall and narrow. The print is about 19 cm tall and only 8 cm wide. In front, a big round stone arch stands on thick, round stone columns. The pale gray stone is lit softly. Through the arch you look into a darker space, and far back, rows of small arches are stacked in levels. The deepest shadow is under the arch on the left.

Nothing in the picture is pure white, and nothing is pure black. The palest part is pale gray stone, and the darkest is a deep gray-brown shadow. In between there are many steps of gray. This is a platinum print. A platinum print is made with platinum instead of silver. These prints are known for a long, soft range of grays between black and white.

Evans was a London bookseller who retired in 1898 to spend all his time on photography. The Cleveland Museum of Art says he believed in "straight", or "pure", photography. Straight photography means printing the photo as the camera and the light made it, with no painting, scratching or reworking. The museum says his prints were "unaltered" and relied on form and light. So the light and the range of grays make this picture. Evans got those right, and then he stopped. Even the shape helps, because the tall, narrow frame fits the tall arch. This chapter follows the same plan. Get the light right first, then do the rest, and know when to stop.

An order for editing one photo

In Chobial's editor, the tools sit along the bottom in this order: **Film**, **Light**, **Color**, **Masks**, **Heal**, **Crop**. The app's own code calls this "the order a photo is worked on". Here's the order I suggest for one photo:

1. Pick the film.
2. Fix the light.
3. Fix the color.

4. Set how strong the film is, and its texture.
5. Crop and straighten.
6. Stop.

It follows the tools, except that the film's texture settings wait until the light and color are right. Masks and **Heal** are in chapter 27.

The film comes first because it develops the RAW. It sets the tone curve and the colors. If you fix the light and then change the film, you'll probably fix the light again.

I fix the light before the color, because colors are hard to judge in a photo that's too dark or too bright. Grain and sharpening are small details, easier to judge once the big things look right. Nothing locks, so you can crop at any point, but I leave it for last.

Your original is never changed

Chobial's edits are non-destructive (chapters 20, 22 and 24). Non-destructive editing means the original photo is never changed, and your edits sit on top of it.

A RAW photo keeps its DNG as it was. A HEIF or JPEG stays as it was saved. The film, your edits and your crop live in a small record next to the file. So you can change any setting later, even the film. Nothing is "baked in". When you save to the Photos app (chapter 31), Chobial makes a new developed copy, and the original stays in Chobial.

Step 1: pick the film

Tap a film, and the photo is developed again from its original. Chapter 24 helps you match a film to the light. Leave **Strength** and the other film settings for step 4.

Step 2: fix the light

Exposure brightens or darkens the whole photo. Highlights moves the bright parts, and Shadows moves the dark parts. Whites sets the very brightest end of the tones, and Blacks sets the very darkest end.

This is a common way to work:

1. Set **Exposure** for the overall brightness.
2. Pull **Highlights** down for a bright sky (chapter 13), and lift **Shadows** for dark parts.
3. Set the two ends with **Whites** and **Blacks**.
4. Finish with **Contrast**.

Watch the histogram so the ends don't clip (chapter 13).

RAW and ProRAW photos have much more room here than HEIF or JPEG (chapter 22). If something came out too dark in a RAW, raise **Exposure** or **Shadows**. The RAW still has the detail.

Step 3: fix the color

Start with **Temperature** and **Tint**. They fix a color cast, the same job white balance does in the camera (chapter 15). Plus on Temperature is warmer, and minus is cooler. Tint moves between green and magenta.

Then come **Vibrance** and **Saturation**. **Saturation** changes every color by the same amount. **Vibrance** is gentler. When you turn it up, muted colors gain the most, and the strongest colors stay almost as they are. So skin and sky don't get too loud. When you turn it down, muted colors go gray first. If you want a little more color, try Vibrance first.

Step 4: strength and texture

Now go back to the film. These settings change this one photo, and the film itself stays the same:

- **Strength** turns the film down toward a plain develop.
- **Grain** adds film grain. It starts at the film's own amount.
- **Bloom** is a white glow around bright parts.
- **Halation** is a red glow around bright lights.
- **Fade** lifts the blacks.
- **Clarity** adds contrast to mid-sized detail, mostly in the midtones. Below zero, it softens that detail.
- **Dehaze** removes haze. Below zero, it adds a soft, light haze.
- **Sharpen** sharpens edges. It works on brightness only, so edges don't get colored fringes.

A film at 100% can be a lot on some photos. Try **Strength** at about 70% and see if you like it better.

Step 5: crop and straighten

The camera saves the whole sensor, so you can change the frame's shape here, long after you took the photo. Chapter 2 has the crop basics. Think of Evans's tall arch in a tall, narrow frame, and pick the shape that fits your subject.

If the horizon tilts, straighten it.

Copy your edits to other photos

Say you shot ten photos in the same café, in the same light. Edit one, copy its edits, and paste them on the rest. Then check each photo. Each one can still need its own small **Exposure** change.

Found masks, like the sky, the subject or people, are found again on each photo. Drawn masks and heals stay in the same place on each photo. They're tied to where things are in one photo, so they start off when you copy. To put

a whole roll in one film, use **Develop Roll In…** on its contact sheet (chapter 24).

In Chobial

Open the editor:

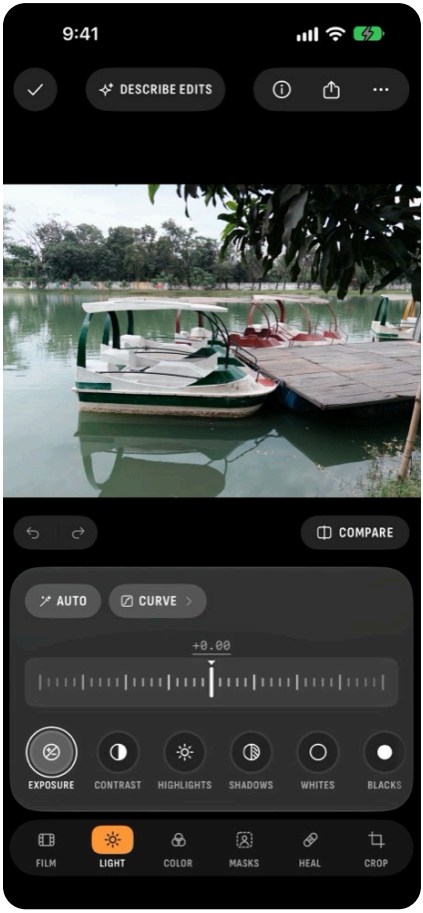
1. Tap the latest photo at the bottom left of the camera, or pick one from the library.
2. Tap **Edit**, the sliders button in the middle of the bottom bar.
3. The tools are along the bottom: **Film**, **Light**, **Color**, **Masks**, **Heal**, **Crop**.

Use the ruler:

Each panel has one ruler, a slider you drag sideways.

1. Tap a setting in the row under the ruler to put it on the ruler. That setting is filled orange.
2. Slide anywhere along the ruler. Zero holds for a moment, so it's easy to find.
3. **Double-tap** the ruler to put it back to zero, or to its starting value. **Tap the number** above the ruler to type an exact value.
4. Tap a setting you changed in the row a second time to turn it off for a moment. Tap it again to turn it back on.

An orange **dot** on a tool's tab means that tool has changed the photo. A short orange dash under a value marks what you moved.



SCREENSHOT the Light panel with Exposure on the ruler and the row of settings under it

Film:

1. Tap **Film**, then tap a film badge. The loaded film is in an orange well, and Pro films have a small lock.
2. In step 4, use the row under the films, from **Strength** to **Sharpen**. **Clarity** and **Dehaze** go from –100 to +100. The others go from 0 to 100%.

Light:

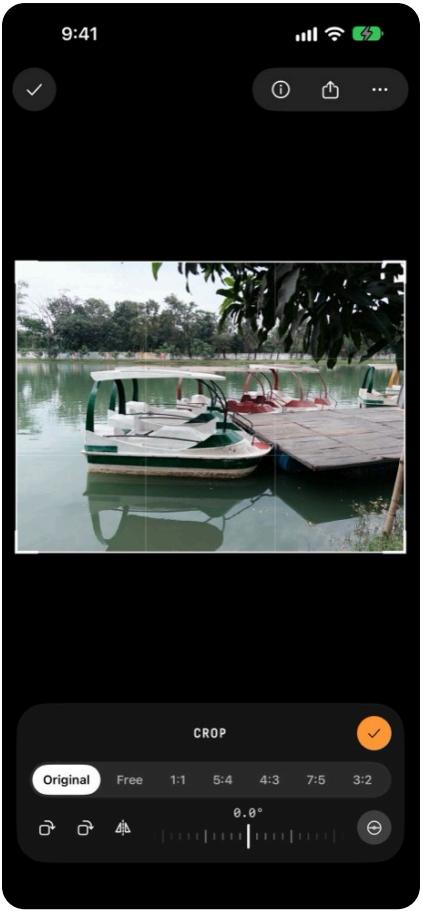
1. Tap **Light**. **Exposure** goes from −3 to +3 stops and shows two decimals, like +0.50. The other five settings go from −100 to +100 and start at 0.
2. Tap **Auto** above the ruler to start from a guess. It sets **Exposure**, **Highlights** and **Shadows** as values on the sliders, so you can change them after. It aims a little over middle gray, but only part of the way, so a night photo stays darker than a day photo.
3. Tap **Curve** to drag a tone curve (chapter 23).
4. Tap **••• › Show Histogram** for the histogram.

Color:

1. Tap **Color**. **Temperature** goes from −3000 to +3000 K, and **Tint** from −50 to +50. **Vibrance** and **Saturation** go from −100 to +100.

Crop:

1. Tap **Crop**. Drag a corner, or drag inside the box to move it.
2. Pick a shape, from **Original** and **Free** to **16:9**. Tap the chosen shape again to switch between tall and wide.
3. In the row under the shapes are **Rotate left**, **Rotate right** and **Mirror**. Then comes a dial that straightens from −15° to +15°.
4. Tap **Auto**, the level icon, to level the photo by its horizon or straight edges. You can change the angle after.
5. Tap the orange checkmark at the top right to finish.



SCREENSHOT the Crop panel with the shapes, the straighten dial and the Auto level button

Check, undo and reset:

1. Tap **Compare** at the bottom right for a before-and-after slider. Hold it to see the photo without its film and edits.
2. Hold a tool's tab to see the photo without that tool's changes.
3. **Undo** and **redo** are at the bottom left. Hold undo to see every step and jump back to one. The first step is "Where you started". The last 30 steps stay with the photo, even after you leave it.

4. Each tool has a red ↺ that resets just that tool. **Reset Film** puts the film settings back, and the film stays chosen.
5. ••• › **Reset All Edits** clears every adjustment. The film, its strength, grain, bloom and halation stay. Chobial asks first.
6. Tap the **checkmark** at the top left when you're done. Edits are saved as you go.

Copy edits:

1. In the edited photo, tap ••• › **Copy Edits…**.
2. Tap the tiles to choose what to copy: **Film**, **Light**, **Color**, **Found Masks**, **Drawn Masks**, **Heal**, **Crop**. **Film** always shows, and the others show only if this photo uses them. Then tap **Copy**.
3. On another photo, tap ••• › **Paste Edits**. For many photos, tap **Select** in the library, choose them, then tap **Paste Edits**.

The copy lasts only while the app is open.

Editing is free. Saving a photo in one of the 24 Pro films needs Pro. Masks and Heal need Pro to save too. Light, Color, Crop and the Film settings save for free.

> **On Android:** Everything in this chapter works the same. Android has no ProRAW, and RAW is saved as DNG. Android is in a closed beta.

See it

This cappuccino was shot as ProRAW on an iPhone 17 Pro Max (24mm, f/1.78, 1/50 s, ISO 800). The cup and saucer are dark gray, with a stripe of cocoa powder on the foam. The table has a cracked, worn gray-blue top, and light reflects off it at the top of the frame.

On the left is the photo in **Negative**, before any edits. Negative is a consumer negative film with hard contrast, teal greens, deep reds and warm highlights. The cup and saucer came out dark.

On the right, the same ProRAW is developed again in **Gold**. Gold is a consumer negative with golden warmth, punchy yellows and olive greens. In Gold, the whole picture turns warmer and browner. The cup and saucer are still dark. To finish the photo, lift them with **Exposure** or **Shadows**, check Temperature, set Strength and Grain, and crop.

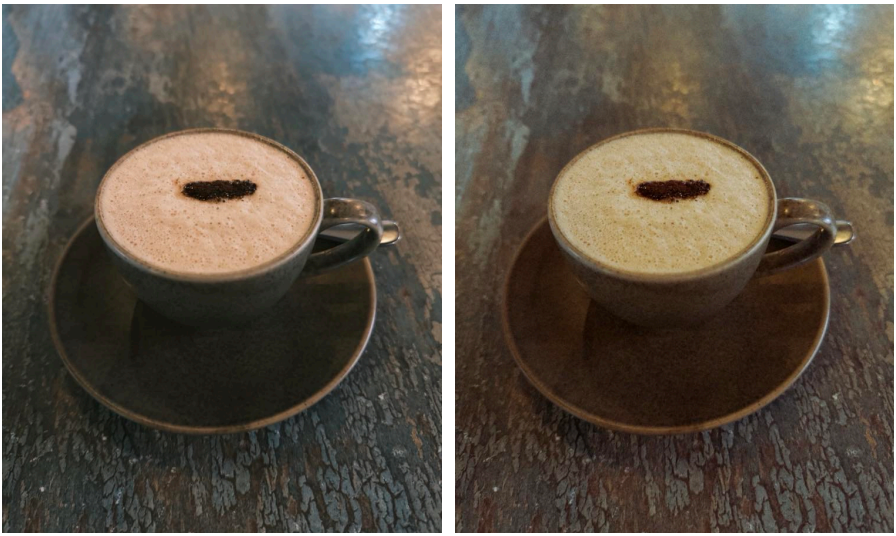


PHOTO PAIR Negative, before edits (cappuccino-negative.jpg) / The same ProRAW developed again in Gold (cappuccino-gold.jpg)

Common mistake

The common mistake is overediting. Overediting means pushing sliders so far that you see the edit more than the photo.

Here are the signs to look for:

- **Too much Saturation:** colors look loud and fake, and skin goes orange or red. Strong colors lose their detail and turn into flat patches, because a

color channel clips (chapter 13).

- **Too much Clarity or Sharpen:** halos appear. A halo is a bright or dark outline along an edge where dark meets bright, like a roof against the sky. Faces look rough.
- **The flat "HDR look":** HDR means "high dynamic range". The HDR look comes from pushing **Shadows** all the way up and **Highlights** all the way down. Everything ends up the same middle brightness, so the picture loses depth and looks gray and flat, often with halos. It's what phones do with local tone mapping (chapter 20), but done by hand.

To spot it, hold **Compare** to see the original. Look away for a minute, then look again. Look at the photo small, as in a phone feed, and at full size. Check skin, and check edges against the sky.

To fix it, go back to each slider and pull it back to about half. Tap the setting in the row to turn it off and compare. You can also hold **Undo** and pick an earlier step, or use the tool's red reset.

My rule of thumb is to stop when the photo looks the way the scene felt to you. Evans got the light right, and then he stopped.

Try it

1. Shoot three photos of one place in RAW, in the same light. If you want to save without Pro, use a free film, like **Standard**, **Chrome**, **Portrait**, **Soft** or **Mono**.
2. Open the first photo and tap **Edit**.
3. Go through the steps in order: film, light, color, then strength and texture, then crop. Make one change per step, and give yourself five minutes in all.
4. Tap **••• › Copy Edits…**, leave the tiles as they are, and tap **Copy**.
5. Open the second and third photos and tap **••• › Paste Edits** on each one. Fix **Exposure** on each if it needs it.

6. On each photo, hold **Compare** to see where you started.

27. Editing part of a photo



PHOTO Clarence H. White, *At the Window*, 1896. The Cleveland Museum of Art.

You've met this woman before. Chapter 7 opened with White's *By the Window*, with the same woman, window and chair. It's almost the same pose, from the same sitting, it seems. Here she leans forward over a wooden

chair in a long, pale dress, and raises one hand to a tall window. Soft daylight comes through the diamond-patterned glass. The tones are soft, warm grays.

The museum lists this print as a "platinum print with watercolor and gouache". Gouache is a thick water-based paint that you can't see through. The signature, "Clarence H. White 1896", is painted on the front, in the lower left. That corner looks painted too. We can't tell where else White added paint. *By the Window* is a "platinum print with crayon", with an arched top, cooler grays and a pencil signature.

So White printed one scene at least twice and worked on each print by hand in a different way. People have changed one part of a photo for as long as there have been prints. In a darkroom it was paint, pencil or crayon. In Chobial it's a mask or **Heal**, and you can undo it.

Why you'd change only one part of a photo

A local edit is a change to one part of a photo only. You need one when a single exposure can't fit the whole scene. A bright sky and a face in shade can't both be right in one photo. The camera measures the bright background and sets the exposure too dark for the face. If you brighten the whole photo to fix the face, the background turns white.

A mask is a selection of one part of the photo, with its own edits. Everything outside the mask stays as it was. So you can brighten only the face, or darken only the sky. That's the backlit friend from chapter 8.

This chapter covers three jobs:

- **A darker sky,** or a bright spot made calmer.
- **A brighter face.**
- **A distraction removed,** like dust, a spot or a wire.

RAW helps a lot here. A sky can look white on screen, but its clouds are usually still in the RAW's brightest highlights. A muddy-looking face still has plenty of detail too. A HEIF has already lost most of that detail (chapter 22). Chobial shoots RAW by default.

Masks Chobial finds for you

Chobial looks at the photo on your phone and finds areas by itself. Nothing is sent anywhere. The found areas are **Subject**, **Background**, **Sky** and **People**. Then come **Person 1**, **Person 2** and so on, if there's more than one person, and **Face 1**, **Face 2**, up to six faces. A tile shows only if Chobial found that area in this photo. If it found separate things, like a cup or a bike, you also get **Tap an Object**. Tap one thing on the photo, and it becomes a mask.

Some photos come without the iPhone's own sky map, like photos from another camera. On those, Chobial offers **Sky** only when it's sure it found the sky. So a photo with a sky may have no **Sky** tile. Then use a **Linear** mask or the **Brush** instead.

Background is everything that isn't the subject. Darken it a little, and your subject stands out (chapter 11). In black and white, a **Sky** mask lets you darken only the sky (chapter 25).

A face mask is a soft oval from forehead to chin, cut to the person's outline. So the wall behind isn't brightened. Chobial may miss a face that's turned away, very small or deep in shadow. Then put a **Radial** mask over it, with **Softness** raised.

Masks you draw yourself

You can also draw a mask. **Brush** paints it with your finger. **Radial** is a soft-edged oval, good for a lamp, a spotlight or a patch of sun. **Color** selects the parts close to a color you tap on the photo. **Luminance** selects a range of brightness, like only the brightest parts.

Linear is a straight fade across the photo. A graduated ND filter is a piece of glass that's dark at the top and clear at the bottom. It darkens a bright sky, so you can set the exposure for the ground. A Linear mask does the same thing after the shot, at any angle.

Starting values from Chobial's help pages

A white sky at dusk: a **Sky** mask with **Highlights** –100, **Exposure** –0.15 and **Saturation** +43. Highlights does most of the work, because the cloud detail is in the brightest part of the sky. If it's still a bit gray, add **Dehaze** +10 to +20.

A backlit face: a **Face** mask with **Exposure** +0.5 to +1.0, **Shadows** +20 to +40 and **Contrast** –10. Shade on a sunny day is blue, so add **Temperature** +200 to +400 K if the skin looks blue. Raise Exposure until you can see the eyes clearly.

A spotlight hotspot: a **Radial** mask with **Highlights** –100, **Exposure** –0.7 and **Softness** 50%.

A whole person in shade: brighten gently with **Subject** or **People**. Then add a **Face** mask for the last half stop.

Heal and Clone

Heal fills a spot from a nearby part of the photo. It blends the fill into the light and color around the spot, so it works well on skin, sky and walls. Near a hard edge, though, Heal smears the edge. **Clone** copies exactly. Use it where a line has to carry on, like between bricks or along a roof edge.

Both are made for small things: dust, spots, a wire, a stray hair. A whole person takes many strokes, so a crop is often better. Chobial has no AI "remove object" tool. Heal only copies from your own photo, so it doesn't make anything up.

Dust on the lens or sensor shows most in skies and on white walls. Zoom in and move slowly across the photo.

Mixer and Grading: some colors, some tones

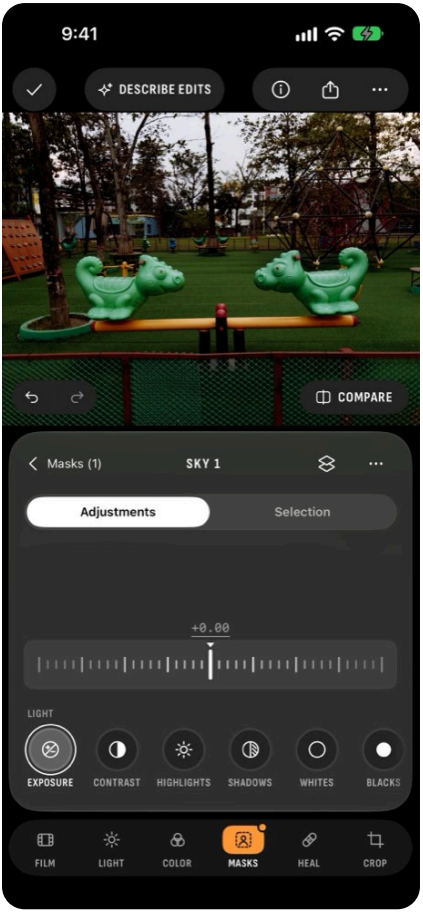
Two tools in **Color** change the whole photo, but only some colors or some tones. **Mixer** changes one color at a time. You can darken only the blue sky, or calm down only the greens.

Grading is for color grading. Color grading means tinting the shadows with one color and the highlights with another. Cool blue shadows with warm orange highlights is a common film-like look.

In Chobial

Add a found mask:

1. Open a photo, tap **Edit**, then tap **Masks**.
2. Tap **New mask**, then a tile like **Sky** or **Face 1**.
3. The mask opens on **Adjustments**. Tap a setting in the row, then slide the ruler (chapter 26). There are Light, Color and Effects settings, like **Exposure**, **Shadows**, **Temperature** and **Dehaze**.
4. **Effect strength** turns down all of the mask's edits at once.



SCREENSHOT a Sky mask open on Adjustments

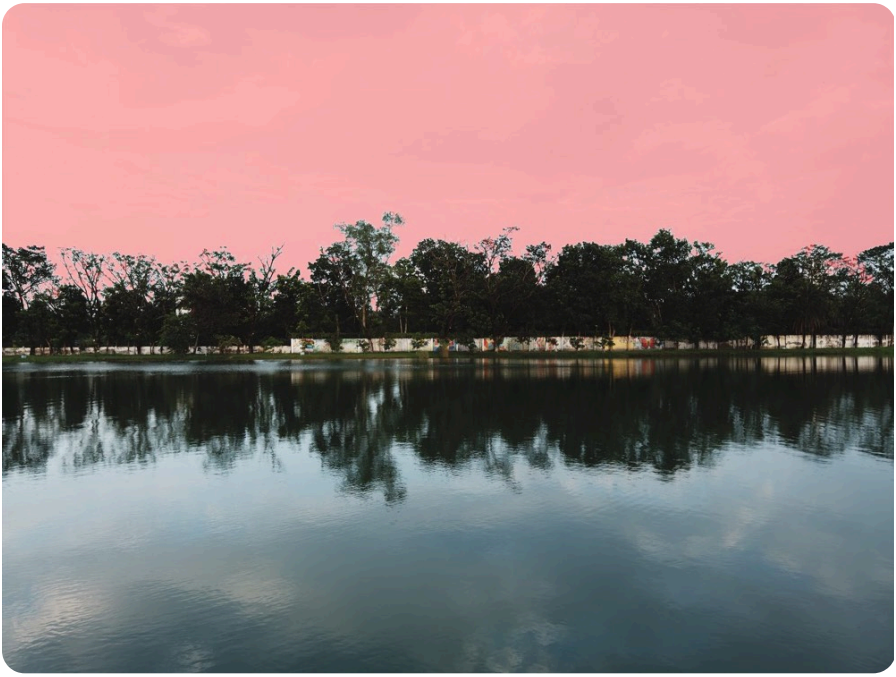
Draw a mask:

1. Tap **New mask**, then pick a kind under **Draw or pick**. It opens on **Selection**, so you can shape it first.
2. **Brush:** set **Size** and **Softness**, then paint. **Erase strokes** takes paint away.
3. **Linear:** drag from where you want the full effect to where it should end. Lines close together give a hard edge, and lines far apart a soft one.

4. **Radial:** drag the center to move the oval. Drag an edge to resize or rotate it.

Fix what a mask covers:

1. Tap the layers button at the top of the panel. The mask shows in red.
2. On **Selection**, tap **Add** or **Remove**. If a sky mask caught a white building, tap **Remove**, choose **Brush**, and paint over the building.
3. In a group photo, make one face mask, then **Add** Face 2 and Face 3. One set of sliders brightens every face.
4. Tap ••• for **Turn Effect Off**, **Invert Selection**, **Duplicate and Invert** and more.



SCREENSHOT the sky mask shown in red, its edge following the treeline (sky-mask-selection.jpg)

Heal a spot:

1. Tap **Heal**, then choose **Heal** or **Clone** at the top.
2. Pinch with two fingers to zoom in.
3. Tap a spot, or drag along a wire. A solid circle marks the spot. A dashed circle marks the source, the place Chobial copies from.
4. Set **Size** a little bigger than the spot. Feather is how soft the heal's edge is. Raise **Feather** if you can see the edge.
5. If a heal looks wrong, tap it and drag the dashed circle to a better source.

Mixer and Grading:

1. Tap **Color**, then **Mixer**. Tap one of the eight colored circles. Its name, like **Blue**, shows under the circles. Then use **Hue**, **Saturation** or **Luminance**.
2. Tap ‹, then **Grading**. Set **Shadow Hue**, **Shadow Amount**, **Highlight Hue** and **Highlight Amount**. **Balance** moves the point where shadows end and highlights begin, so one color covers more of the photo.

Masks, Heal and Clone are free to try on any photo. Saving or sharing a photo that has them needs Chobial Pro. Without Pro, the photo still saves for free, without them. Tap **Save Without Masks and Heals, Free** when Chobial asks. Mixer and Grading save for free, like the rest of the editor in a free film. So try everything, and decide about Pro only if you want to keep the result.

> **On Android:** Everything here is the same, including the Pro rule. Chobial finds the areas with Google's models on your phone. If a model isn't on the phone yet, its areas don't show up. **Mixer** doesn't show the color's name under the circles. Android is in a closed beta.

See it

A lake at dusk, with trees on the far bank, developed in **Chrome**, a free film. On the left there's no mask, and the sky has gone pale and white. On the right, one **Sky** mask brings back the blue sky and clear clouds. The trees and water stay the same.



PHOTO PAIR No mask, white sky (sky-mask-before.jpg) / One Sky mask, blue sky back (sky-mask-after.jpg)

Common mistake

The common mistake is an edit you can see, pushed so far that the mask's edge shows. Look for these signs:

- **A light halo** along the treeline under a dark sky.
- **A face that looks lit,** as if a spotlight is on it.
- **A darker ring** around a Radial mask.
- **A heal that smears an edge** or repeats a pattern.

To fix it, lower the setting. Raise **Softness** on a Radial mask, or **Feather** on a heal. Use **Clone** near hard edges. On a face, lower Exposure and raise Shadows instead. Then use **Turn Effect Off** and **Turn Effect On** to compare, or hold the **Masks** tab. The face should look as if the camera exposed it properly.

Try it

1. Stand a friend in front of a bright window or sky, and shoot in RAW. Expose for the background.
2. Open the photo, tap **Edit**, then **Masks**.
3. Tap **New mask › Face 1**. Set **Exposure** +0.5 and **Shadows** +30.
4. Tap **New mask › Sky**, and bring **Highlights** down.
5. Turn each effect off and on to compare.
6. Tap **Heal** and remove one small distraction.
7. Without Pro, compare in the editor, or tap **Save Without Masks and Heals, Free**.

In chapter 28, **Describe Edits** can change only the sky or a face, when you ask in words.

28. Describe Edits and your own looks



PHOTO Julia Margaret Cameron, *Julia Herschel*, 1865. The Metropolitan Museum of Art.

A young woman looks off to the left, away from the camera, with a calm, serious face. The crop is close, just her head and shoulders. Light comes from the left and falls on her face. The background is dark and blurry. Her

face is fairly clear, but the edges of her hair and dark dress melt into the dark. The print is warm brown.

Julia Margaret Cameron took up photography around 1863, at about 48, when her daughter and son-in-law gave her a camera. Julia Herschel was a daughter of Sir John Herschel, the astronomer and a friend of Cameron's. Critics disliked the soft focus. In 1865, the year of this photo, *The Photographic Journal* called her work a series of "out-of-focus portraits of celebrities". She kept the look anyway.

Cameron's look is a set of choices: a close crop, soft focus, a dark background, a warm print and light from one side. She made the same choices again and again, so you can spot a Cameron from across a room. You could say her look in one sentence. In this chapter, you'll find a look in words, keep it as a film with your name on it, and share it.

Asking for a look in words

Sometimes you know what you want, but not which slider does it. **Describe Edits** is for that. You type or say how the photo should look, and Chobial moves the sliders for you.

Every change is an ordinary slider that you can see, take further or take back. Each change shows as a small chip under your request. A chip has the slider's name, where the slider is now and how far it moved. Green means it went up and red means it went down. "Exposure +1.20 ↑ +0.40" means Exposure is now +1.20, up by 0.40.

So read the chips after each request. They tell you which slider did the job, so next time you can do it by hand.

Describe Edits needs Apple Intelligence, the AI built into some iPhones and iPads, which runs on the device itself. If your device can't run it, Chobial doesn't show the button. Your request and your photo stay on the device. The app says: "Worked out on this device. Nothing is sent anywhere."

The microphone is a little different. Chobial asks your device to turn speech into words on the device, but some devices and languages can't. Then the speech service may handle the audio on its own servers. If that worries you, type instead.

What you can ask for

Ask for how the photo should look. Put several things in one request with commas or "and", like "warmer and a darker sky".

- **Light:** "brighter", "darker highlights", "lift the shadows", "deeper blacks". These move Exposure, Highlights, Shadows, Whites and Blacks.
- **Color:** "warmer", "too yellow", "less green". These move Temperature, Tint, Vibrance and Saturation.
- **Tone and texture:** "moodier", "crisper details", "less haze", "faded film", "more grain". These move Contrast, Clarity, Dehaze, Fade and Grain.
- **One color:** "make the greens more yellow". Only that color changes. Teal, cyan and turquoise all mean aqua, violet means purple and pink means magenta.
- **Part of the photo:** "darker sky", "brighter face", "cooler background". Chobial finds the sky, the subject, the background, people or a face and makes a mask for it (chapter 27). Fade and Grain can't go on a part.
- **A film:** "like Portra 800" or "Classic Chrome, a bit warmer". Name one of Chobial's films or the film stock it's modeled on. The film loads, and the rest of the request goes to the sliders.

A new request starts from the photo as it is now. So "warmer", then "a bit more", does what you'd expect.

Keeping a look as your own film

Once you like a look, **Save as Film** keeps it. Copy Edits (chapter 26) carries edits to photos you already have. A film develops every new photo, and you can load it on the camera, so the viewfinder shows your look live.

Some edits go into the film: exposure, temperature and tint, contrast, highlights, shadows, whites, blacks, fade, curves, saturation, vibrance, the Mixer and Grading. The film's own settings, like grain, go in too. Other edits stay with the photo only, because they only make sense on one picture: clarity, dehaze, sharpening, masks, heals and the crop.

You can also make a film from a file. A LUT is a big table that maps each color to a new color. LUT files end in **.cube**, and Chobial takes 3D .cube LUTs. Lightroom is Adobe's photo editor, and Chobial reads its presets as **.xmp**, **.lrtemplate** or **.dng** files. A preset moves sliders from where the photo already is (chapter 23). As a Chobial film, it develops the RAW.

A film has no place for some preset settings, like white balance in kelvin, texture, masks or the crop. Chobial tells you what it left out. Fujifilm recipes come in chapter 29.

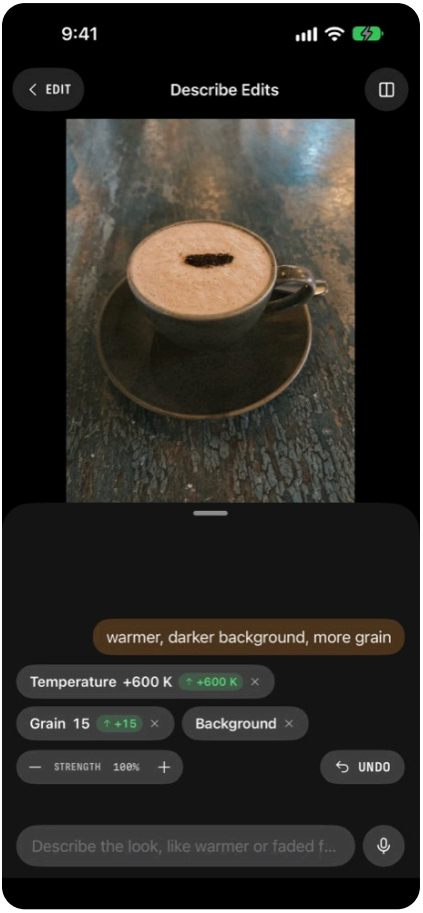
LUTs come in two kinds. A creative LUT is made for a normal finished picture, so it works on photos. A log LUT, with a name like "Apple Log to Rec.709", is made for flat, gray video. It adds a lot of contrast and color. On a photo it adds them a second time, and the picture looks heavy and crushed. Fujifilm's official film simulation LUTs are log LUTs too.

In Chobial

Describe Edits:

1. Open a photo and tap **Describe Edits**, next to **Edit** at the bottom. While editing, it's in the top bar.
2. Type in the box, or tap the **microphone**, speak, and tap it again when you're done.

3. Read the chips. Tap the **×** on a chip to take back only that change. The × is there only on the latest request.
4. **Strength** with **–** and **+** makes the whole latest request weaker or stronger without asking again. It starts at 100% and goes from 25% to 300%.
5. **Undo** takes back the whole latest request. Hold **Compare** to see the photo before it.
6. Each photo keeps its requests. Tap an earlier one, then **Go Back to This** to return the photo to that point, or **Now** for the present.



SCREENSHOT Describe Edits with the request "warmer, darker background, more grain" and its chips under it

To hide it, turn off Settings › **Describe Edits**. Your edits stay.

Save as Film:

1. In the editor, tap the **Film** tool, then **Save as Film** in the top row.
2. The film editor opens on the new film. Change anything you like, then tap the **checkmark** at the top right. ✕ leaves without saving.

3. The photo moves onto your new film, so it looks the same. The film shows in **Films** under **My Films** and on the camera's film row.

Import a LUT or a preset:

1. Save the file to Files. In Lightroom mobile, use **Share › Export as › Preset** on a photo that has the preset.
2. Open **Films** with **Controls › Film › Manage Films**, or from **Settings**.
3. Tap **+ › Import Film, LUT or Preset…** and pick the file.
4. For a LUT, set **Strength** in the film's **LUT** section. 60–80% often looks best. The LUT goes on first, so you can add grain and halation on top.

Share a film and add a friend's:

1. In **Films**, tap ••• on one of your films, then **Share Film**. The card turns over to show its QR code, which a friend can scan with their camera.
2. Tap **Share Film** again to send it **As a Link**, **As a Picture** or **As a File**. A film built on a LUT goes as a file, with the LUT inside. If you paid for the LUT, check its license first.
3. To add a friend's film, tap their link or file, or tap **+ › Scan Film Code…**. **Scan from a Picture** reads a code in a screenshot.
4. **Film Received** shows your latest photo in that film. Tap **Load It** to shoot with it now, or **Add to My Films** to keep it for later.



SCREENSHOT Film Received with Load It and Add to My Films

Describe Edits, Save as Film, importing, sharing and adding films are all free. Saving photos in a film made from one of the 22 free films, or from your own LUT or preset, is free too. The one exception is a LUT that copies one of Chobial's Pro films, and the app checks for that. Chobial Pro is needed to save a photo with masks, including masks Describe Edits made. Without Pro, the photo saves free without them. Pro is also needed to save in a Pro film or a film built on one. Exporting a film as a .cube LUT or a Lightroom preset needs Pro too.

> **On Android:** Describe Edits needs Gemini Nano, Google's AI model that runs on the phone. Only some Android phones have it. The first time, the phone may download the model, and Chobial shows the progress. **Save as Film** asks for a name first. Then the film editor opens on the new film. Everything else is the same. Android is in a closed beta.

See it

Try one request on a photo of a cup of coffee by a window, shot in a free film. Ask for "warmer, darker background, more grain". The chips show Temperature and Grain going up, and a mask that darkens the background. Because of the mask, saving this photo needs Pro.

Common mistake

The common mistake is asking for a whole famous style or a vague mood in one long request. Then you add more and more requests, until the photo is overedited (chapter 26). You can spot it when there are lots of chips, the numbers on them are very big, and skin or sky looks wrong.

To fix it, ask for one or two things per request. Tap **–** for a weaker request, or tap the **×** on the chip that went too far. **Undo** takes back the latest request, and **Go Back to This** returns to an earlier one. Then read the chips to learn which sliders made the look.

If an imported LUT looks heavy and crushed, it's probably a log LUT. Lower its **Strength**, or use a creative LUT.

Try it

Make your own film in four requests.

1. Take a photo in a free film, then tap **Describe Edits**.

2. Make a look with four short requests, like "warmer", "faded film", "more grain" and "a bit darker". Don't ask for the sky or a face, because those make masks, and masks need Pro to save. Don't name a Pro film either.
3. On your last request, tap the **×** on one chip you don't like.
4. Tap **Edit**, then **Film**, then **Save as Film**. Give the film a name under **Info**, and tap the **checkmark**.
5. Load your film on the camera and shoot three new photos with it.
6. In **Films**, tap **••• › Share Film** and let a friend scan the QR code.

29. Photos from your other camera



PHOTO Eugène Atget, *Rue de la Montagne-Sainte-Geneviève*, 1898. The Cleveland Museum of Art.

A narrow Paris street paved with cobblestones runs away from us. Tall dark buildings with shop signs close in on both sides. At the end stands a church with a tall tower and a clock, under an almost white sky. Near the far end

there's a faint, see-through blur. It's probably a person who moved while the plate was being exposed (chapter 9).

Eugène Atget (1857–1927) wanted to record the old streets of Paris before they were pulled down. He sold his photos as "documents for artists". The museum says that may be why he shot early in the morning, when a busy street like this one was empty.

Atget made negatives on glass plates. Decades later, other people made new prints from them, and museums scan his work again today. A negative can be developed again, by anyone, years later. A RAW file from your own camera works the same way, and Chobial can develop it.

If you only have a phone, you can read this chapter quickly. The import steps also work for photos from other phone apps and from a friend's camera.

Why your camera's RAW looks plain

Each camera maker has its own RAW file type. Fujifilm saves **RAF**, Sony **ARW**, Nikon **NEF** and Canon **CR3** (older Canons use CR2). Some cameras, like Leica's, save **DNG**. Each one holds the sensor data before any look is added (chapter 22).

A Fujifilm camera makes its JPEG with a film simulation, such as Provia or Classic Chrome. The simulation is a setting. The camera uses it to make the JPEG, and the RAF keeps the plain sensor data. So a RAF opened in another app looks plain, with no film simulation on it. Other makers work the same way.

Fujifilm doesn't publish how its simulations are built, so apps can only measure them. As chapter 23 said, 24 of Chobial's films are my own looks, mostly measured from two Fujifilm cameras. I developed one RAF in the camera at Provia, with every setting at its default. Then I developed the same file with the simulation I wanted, also at defaults. Both pictures had the same pixels, exposure and white balance, so the only difference was the look. I measured that difference, and it became a Chobial film.

These are my own measurements, without Fujifilm's code or names. Chobial is not connected to Fujifilm.

Films to start from

- **Classic Chrome** → **Chrome** (free). My take on documentary color from the slide-film years: muted color, firm shadows, skies that lean cyan.
- **Classic Negative** → **Negative** (Pro). Fujifilm says Classic Neg. was modeled on Superia. A free film near it is **Snapshot**, modeled on Fujicolor Superia X-TRA 400.
- **Nostalgic Neg.** → **Nostalgia** (Pro). My take on 1970s color prints, with amber highlights.
- **Reala Ace** → **Natural** (Pro), modeled on Fujicolor Reala.
- **Acros** → **B&W** (Pro), modeled on Neopan Acros 100. The free black and white film is **Mono**.

The others are in chapter 24. Saving a photo in a Pro film, or in a film made from one, needs Chobial Pro. Importing, developing and making films are free.

Turning a Fujifilm recipe into a film

A Fujifilm recipe is a list of camera settings someone wrote down, so others can set the same look. It starts with a film simulation, and the other settings change it a little. There's no file, so Chobial can't import a recipe, but you can rebuild it as a film in a few minutes. (Lightroom presets are files, and chapter 28 shows how to import them.)

The simulation does most of the work, so pick the right starting film first. Then go down the recipe:

- **Film Simulation** → **Start From**.
- **White Balance** and its shift → **Develop › Temperature** and **Tint**. Fujifilm's shift steps don't convert exactly to kelvin, so this is only close.

- **Highlight tone** → **Tone › Highlights**. **Shadow tone** → **Tone › Shadows**, with the sign flipped. On a Fujifilm camera, +1 makes shadows deeper, so use a negative value in Chobial. Yes, it feels backwards. Write it on your hand.
- **Color** → **Color › Saturation**.
- **Grain Effect** → **Effects › Grain Stock**. Weak/Small is about "35mm ISO 100". Strong/Large is about "35mm ISO 400" or coarser.
- **Dynamic Range** 200 or 400 → **Tone › Highlight Rolloff**, which sets how gently highlights fade to white.

If the recipe suggests exposure compensation, set it when you shoot: drag up or down on the picture, or tap **EV**.

In Chobial

To import photos:

1. Tap your latest photo at the bottom left of the camera to open the library.
2. Tap **Import Photos** at the top, beside Settings. **From Photos…** picks from the Photos app, and **From Files…** picks RAWs saved in Files or on a drive.
3. To import from the camera, connect it with a USB cable. A card reader works too. It's a small device that holds your camera's memory card and plugs into the phone. If the plug doesn't fit, you need an adapter.
4. Under **Cameras and Cards**, tap **Find Connected Cameras** the first time and allow access. Then tap your camera or card.
5. The new photos are already picked, and older ones say **Imported**. Tap **Import** (like **Import 24**).

On iPhone and iPad, Chobial reads RAWs with Apple's own RAW support, which covers most cameras. If your camera is too new, Chobial tells you it can't read RAWs from it yet. Then import the camera's JPEG, or a DNG made from the RAW.

Photos arrive in **No Film**, a plain develop. Open one, tap **Edit**, choose **Film** and tap a film (chapter 24). The original stays as it was.

To make a film from a recipe:

1. Open **Films** with **Controls › Film › Manage Films**.
2. Tap **+ › New Film**, then **Start From**, and pick the nearest film.
3. Under **Info**, give it a name and a badge code of up to three letters.
4. Go down the recipe: **Develop**, **Tone**, **Color**, **Color Mixer**, then **Effects**.
5. Tap the **checkmark**. Your film shows under **My Films** and on the camera's film row.

> **On Android:** Chobial reads RAWs with its own reader, including DNG, CR3, NEF, ARW and RAF. Pick RAW files with **From Files…**. There's no **Find Connected Cameras**: tap your camera, and Android asks once if Chobial may use it. A card reader doesn't show under **Cameras and Cards**, so tap **Card Reader or USB Drive…** instead. Android is in a closed beta.

See it

Import one RAF from a Fujifilm camera and look at it in **No Film** first. That's how it arrives: plain and a little flat. Then switch it to **Chrome**. In Chrome, the greens get quieter, the shadows get firmer and the sky leans cyan.

Common mistake

The mistake is putting a Chobial film on the camera's JPEGs. With a film simulation on, the JPEG already has a look baked in. A Chobial film adds a second look, so colors get heavy, shadows go too dark and skin looks odd.

Each photo's corner in the library says **RAW**, **PRO**, **HEIF** or **JPEG**. If it says **JPEG** and the look is stronger than the same film on your phone photos, import the RAW instead. On iPhone, if the camera saved a RAW and a JPEG of one shot, the import list doesn't pick the JPEG at first. If the camera

saved only JPEGs, turn the film's **Strength** down, or use **No Film**. Next time, set the camera to RAW or RAW+JPEG. RAW+JPEG is a setting that saves a RAW and a JPEG for every shot, with the same name.

Try it

Develop one shoot from your camera in two films.

1. Set your camera to RAW (or RAW+JPEG) and shoot 10 photos of one place.
2. Connect the camera or a card reader, tap **Import Photos**, pick it under **Cameras and Cards**, and import.
3. Open one, tap **Edit**, choose **Film** and pick **Chrome**.
4. Copy its edits and paste them onto the other nine (chapter 26).
5. Open the first photo again and try **Snapshot**. Which one fits the place?
6. If you use a Fujifilm recipe, rebuild it with **+ › New Film** and develop the shoot in it.

No other camera? Do the same with a friend's RAW files saved to Files, or with photos already in your Photos app.

30. Choosing your best photos and telling a story



PHOTO Gordon Parks, *Washington, D.C. Mrs. Ella Watson, a government charwoman, and her grandchildren*, 1942. Library of Congress, Farm Security Administration/Office of War Information collection.

This is a narrow room in Ella Watson's home. She sits in the middle in a light dotted dress and looks down at the children with a soft face. A baby sits on her knee, and a small child leans on her lap. Another child sits on a small wooden table in front and looks straight at the camera. A young woman stands in the doorway at the back, and an open door shows rooftops.

You met both of them in chapter 3. In 1942, Gordon Parks worked for the Farm Security Administration (FSA) in Washington, D.C. Ella Watson cleaned offices in the building where the agency worked. After his first photo of her, he kept photographing her. The Gordon Parks Foundation says she gave him access to her home and her community for four months. The Library of Congress holds dozens of his photos of her. They cover her work, her home, her family, her church and her leaving for work at 4:30 p.m.

American Gothic is the famous one. In my view, that photo on its own shows her at work, as a symbol. This warm, close frame shows another side of her life. Together, the frames tell much more than any single one. If I were putting them in order, I'd open with American Gothic and end with her leaving for work at 4:30 p.m.

What "editing" first meant

Today "editing" usually means changing a photo with sliders (chapter 26). In photography, the word first meant choosing which photos to show, and in what order.

Film photographers often did this on the contact sheet. They looked at each tiny frame with a loupe and marked the ones they wanted, often with a grease pencil. You can do the same on your phone, with cleaner fingers.

Picking your keepers

A keeper is a photo good enough to keep and show. Culling means going through a shoot and taking out the weak photos. Showing 6 photos from 36 is normal.

Near-duplicates are several photos of nearly the same thing. You get them when you work the scene (chapter 6) or shoot a burst. You only need the best one from each group.

To choose between near-duplicates, zoom in and check what matters most:

- Is the subject sharp where it counts, like the eyes (chapter 14)?
- Are the eyes open?
- Is the moment right? Look at the step, the smile or the gesture.
- Is anything growing out of a head or cut off at the edge?
- Is the horizon straight (chapter 3)?
- Is the sky clipped (chapter 13)?

Pick one and let the rest go. Then ask a harder thing of each keeper: why would anyone else want to look at it? A photo can mean a lot to you because you were there. A viewer only sees the frame.

Choose in two passes

I'd go through a shoot twice. The first pass is quick and finds the clear misses: blurry photos, shut eyes, wrong exposure. The second pass is slow, and you compare the good ones.

If you can, wait a day before the second pass. The feeling of the day fades, so you see the photo itself more clearly.

Putting a set in story order

A photo story, or photo essay, is a set of photos in order about one person, place or event. One great photo beside three similar ones looks weaker, so keep the set small.

Here's one common order. Treat it as a guide.

1. **Opening shot.** Your strongest or most surprising photo, which says what the story is about.
2. **A wide shot.** It shows the place, so the viewer knows where they are. Photo editors call this an establishing shot.
3. **Middle shots.** People doing things, at a medium distance.
4. **A close shot.** A face or hands, near.
5. **A detail.** A small thing that says a lot, like a cup, a tool or a sign.
6. **An ending.** A quiet photo that closes it: someone leaving, the light going, a door.

Change the distance between neighbors, too: wide, medium, close. Two very similar photos side by side feel like the same photo twice.

One film on every photo makes a set look like one roll: use **Develop Roll In…** (chapter 24) or **Copy Edits** and **Paste Edits** (chapter 26).

In Chobial

Chobial has no star or favorite button. You choose by keeping, deleting and picking.

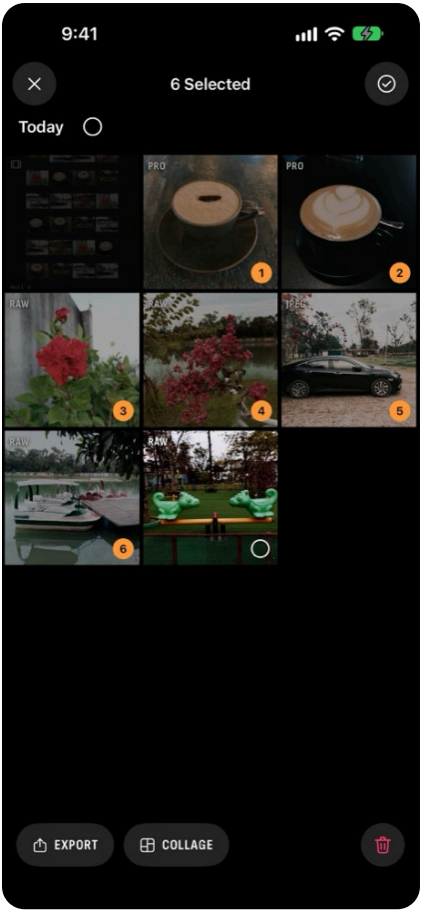
1. Tap your latest photo at the bottom left of the camera, then tap **‹** for the library. The pill at the bottom switches between **All**, **Edited**, **Collages** and **Rolls**.
2. Open a photo. **Drag sideways** for the next or previous one, or tap one in the strip of small photos at the bottom. **Pinch** or **double-tap** to zoom in and check sharpness.
3. To delete a clear miss, tap the bin at the bottom right. Chobial asks "Delete this photo? The original file will be removed." Tap **Delete**, and you land on the next photo.
4. To pick photos, touch and hold one in the library, or tap **Select** at the top. Tap photos, or **drag a finger** across the grid to pick a run. While you pick,

a circle shows beside each day. Tap it to pick the whole day. The title shows the count, like "6 Selected".

5. Each picked photo shows a number: the order you picked it in. A collage uses that order, so pick your keepers in story order.
6. Tap **Collage** (2 to 36 photos). Up to 9 photos start on the **Grid** layout. To change the order, hold a photo and drag it onto another to swap them. Tap **Done** (the checkmark) to keep the collage in the **Collages** album.

Chobial has no Recently Deleted folder, so a deleted photo and its RAW are gone. With iCloud sync on, it also goes from your other devices. Copies you saved to the Photos app stay there. Delete only the clear misses.

Picks aren't saved, and **Cancel** clears them. Finish in one go, or make a collage to keep your order.



SCREENSHOT The library in Select mode, "6 Selected", each picked photo with its number, and Collage at the bottom

A roll's contact sheet is in the **Rolls** album. It's one picture, so you can't tap a frame to open it. Note the frame numbers you like and find those photos in the library, where the newest comes first. A frame you delete leaves a blank place on the contact sheet, like a spent frame on film.

> **On Android:** All of this works the same, including picking, numbers and collages. There's no iCloud, so the line about other devices doesn't apply. Android is in a closed beta.

See it

Make a pair from one burst: the same scene, two frames a second apart. The first is a near miss, where the eyes are half shut or a hand covers the face. The second is the keeper, where the moment and the face both work.

Zoom in on the face in both, and check the eyes first.

Common mistake

The trap is showing everything, or five near-duplicates of the same thing. Each extra similar photo makes the set weaker, and the viewer stops looking.

To spot it, look for two photos where you'd have to say "the other one is a bit different because…". Keep one of them.

A second trap is choosing a photo because it was hard to get, or because you loved that day. Ask what a stranger would see in the frame.

Try it

Cut a 36-frame roll down to the best 6, in order.

1. Tap the **Rolls** tile in **Controls** until it says **36**. Shoot the roll of one place, or one person's afternoon.
2. When your latest photo says **ROLL DONE**, open the library to see the contact sheet. Note the frame numbers you like.
3. First pass: open the photos in the library, drag sideways through them and pinch to check sharpness. Delete the clear misses if you want to.

4. Second pass: tap **Select** and pick 6 in story order: opening, wide, middle, close, detail, ending. Watch the numbers.
5. Tap **Collage**. It starts on **Grid**. Swap any photos that sit in the wrong place, then tap **Done**.
6. Look at the collage the next day. If a better photo is in the roll, pick the 6 again with it and make a new collage.

If you want the set to share one look, use **Develop Roll In…** on the contact sheet before step 3. Chapter 31 shows how to share your set.

31. Sharing your photos

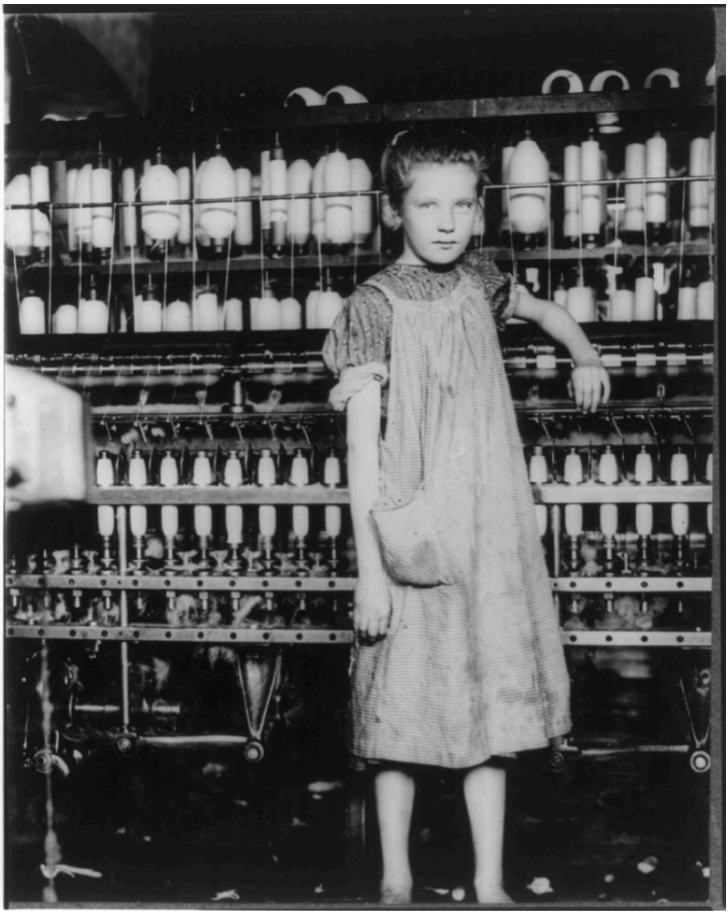


PHOTO Lewis W. Hine, *Addie Card, 12 years. Spinner in North Pownal Cotton Mill, Vt.*, 1910. Library of Congress, National Child Labor Committee collection.

A thin girl stands in front of a long spinning machine in a cotton mill. Her left arm rests on the machine. She wears a long checked apron over a dress, with one sleeve pushed up. Rows of white bobbins (spools of thread) fill the

frame behind her and fade into the dark at the left. She looks straight at the camera.

Lewis W. Hine made this photo in February 1910 for the National Child Labor Committee. The committee was a group that worked to end child labor in the United States, and it used his photos in that campaign. The girl was a spinner. A spinner watched the spinning machines and fixed broken threads.

Hine wrote a caption for his photos with the child's name, age and place. The Library of Congress record of this one says: "Addie Card, 12 years. Spinner in North Pownal Cotton Mill. Girls in mill say she is ten years. She admitted to me she was twelve; that she started during school vacation and now would 'stay'. Location: Vermont."

The caption is part of the picture

Without the caption, this is a photo of a girl by a machine. With her name, her age and the place, it's evidence. Hine wrote the place down so that everyone could read it.

When you finish a photo for sharing, you make three choices. How big is it? What goes around it (a frame)? What words go with it (a caption)? Then there's one thing to check: what the file says about you. For your own photos, the place is often the thing to leave out.

What your photo file says about you

A photo file carries hidden text with it. This text is called metadata. It holds the date, the camera settings and sometimes the place on a map, as a GPS position.

That position can show where you live, where your children go to school or when you're away from home. Anyone who gets the file can read it.

Don't count on the app you post to for removing it. Some apps remove the location and some keep it. Email and file sharing send the file as it is, location included. The safest habit is to remove it yourself before the file leaves your phone.

The iPhone's own Camera app can save your location in photos. If you share from Apple's Photos app, the share sheet has an **Options** button at the top. It has a **Location** switch to leave the place out.

A caption can say what, who, where and when, and you choose the words. "A cafe in Lisbon" may be fine for a public post, but your street and house number aren't. A GPS position gives your exact spot, to the meter, whatever your caption says.

Size and shape for the app you post to

A full-size file is big. Many apps shrink photos again when you post them, with their own compression, and that can make them softer. If you send a size the app keeps, it won't shrink the photo again.

On Instagram, the tallest photo shape in the feed is 4:5, a portrait shape. Your profile page shows each post as a 3:4 grid tile, cut from the middle. If you want the grid to look whole, keep the subject in the middle and away from the top and bottom edges.

A frame, also called a mat, pads a photo out to a shape like 4:5 without cropping it. Without a mat, a wide photo shows small in the feed, and the 3:4 grid tile cuts off its sides.

In Chobial

Export a photo

1. Open a photo in the library and tap **Export** at the bottom left. While editing, it's at the top right.

2. Under the photo are tiles: **Frame**, **Caption** (only with a frame on), **Location**, **Format** and **Size**. A tile turns orange when it's on.
3. A line under the photo sums up your choices, for example "JPEG · 4032 × 3024 · Label · No location".
4. Tap **Save to Photos**, or **Share** to send it to another app or person.



SCREENSHOT The export sheet with the Border frame at 4:5, the tiles underneath and the summary line

Frames

Tap **Frame** and choose **Off** or one of five styles:

- **Label**: a paper mat in the photo's own shape, with your caption and the film settings.
- **Border**: an even mat, or one that fits the photo to a shape like 4:5. It starts at 4:5 on white.
- **Instant**: a wide mat with a label set like a museum's.
- **Film Card**: the film's settings, with a code anyone can scan to load the film in Chobial.
- **Negative**: a strip of 35 mm film on black, with the film and date along its edge.

Frame Settings has the **Shape**, **Border** width, **Color**, **Typeface** and what the frame prints. A frame never crops the photo. Chobial draws it into the picture's pixels, so it stays even when an app throws the file's hidden information away.

Caption and location

1. To write a caption, open the photo, **swipe up** (or tap ⓘ) and tap **Add a Caption**. Chobial writes it into the file's metadata, so Photos and other apps show it too.
2. In the export sheet, with a frame on, turn on **Caption** to print it on the frame.
3. The **Location** tile is **Off** to start with. Off, the saved file has no GPS position, and the summary line says "No location".

Photos you take with Chobial's camera have no location, because Chobial doesn't ask for it. Location comes in with photos you import from the iPhone's Camera app or another camera (chapter 29). So the tile matters most for imported photos. A note under the tiles says the same: "Chobial never records where you take a photo. This only removes the location from imported photos. RAW files keep it."

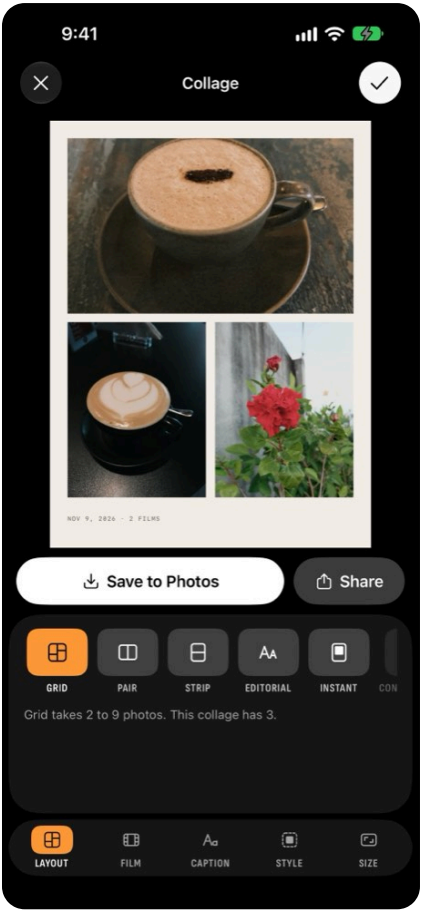
Format and size

1. Tap **Format** to go through **JPEG**, **HEIC** and **RAW**. JPEG and HEIC are the developed photo, with film and edits.
2. **RAW** is the original file, and it goes out as it is, with any location still in it. So **Location**, **Frame** and **Size** are grayed out. RAW export needs Pro.
3. Tap **Size** for **Full Size**, **2048 px** or **Instagram**. **2048 px** is sharp on any screen and a fraction of the file. **Instagram** is 1440 pixels wide, the most Instagram keeps, so it won't shrink the photo again.

Many photos, collages and reels

To export several photos, tap **Select** in the library, pick them and tap **Export**. Chobial puts your caption on every photo.

For a collage, tap **Select**, pick 2 to 36 photos in order and tap **Collage**. The tabs along the bottom are **Layout**, **Film**, **Caption**, **Style** and **Size**. The layouts are **Grid**, **Pair**, **Strip**, **Editorial**, **Instant**, **Contact Sheet** and **Carousel**. Each one holds a set number of photos, and a layout that can't hold yours is grayed out. **Film** puts one film across every photo, so the set looks like one roll. The **Caption** tab has a **Place** tile that prints the town of the first photo with a location. Check that name before you post. **Size** offers 3:4 "Instagram grid" and 4:5 "Instagram, Threads", among others. Each one shows the pixels it saves, about 3000 on the long side, like 2400×3000 for 4:5. Tap **Done** (the checkmark) to keep it in the **Collages** album.



SCREENSHOT A 3:4 Grid collage of three photos, with the Layout, Film, Caption, Style and Size tabs

For a reel, open a photo, tap ••• and choose **Reel from Edits…**. A reel is a short vertical video of one photo, in one of four styles: **Edit Steps**, **Before & After**, **Films** or **Film Card**. It has no sound, so you add music in the app you post to. Tap **Share Reel**, or **Save…** to save the video.

What's free

One photo at a time as JPEG or HEIC, in a free film, is free with any frame, caption and size. **Grid** and **Pair** collages save free, and every collage can be kept with **Done**. Pro adds these:

- RAW export, and saving several photos at once.
- The other collage layouts, and one film across a collage.
- Saving or sharing a reel. Watching it in Chobial is free.
- Photos in Pro films, or with masks or heals.

Pro also adds **Settings › After Capture › Save to Photos**. It saves every photo to Photos as you take it, in the film you've loaded. A padlock marks anything that needs Pro.

> **On Android:** The buttons and the setting say **Save to Gallery** instead of **Save to Photos**. With RAW, Save to Gallery puts the developed JPEG and the original side by side. Everything else works the same. Android is in a closed beta.

See it

Share the same wide photo two ways.

First, export it with **Frame** off at **Full Size** and post it to Instagram as a wide photo. It shows small in the feed. Second, use the **Border** frame at 4:5 on white and the **Instagram** size. The whole photo is there on a white mat, and it fills more of the screen.

Common mistake

The big one is posting a photo with the location still in it. It's often a photo of home, imported from the phone's own camera or another camera.

To spot it, read the summary line in the export sheet. It says "Location" or "No location". Keep **Location** off. In Apple's Photos app, use **Options** in the share sheet.

A smaller trap is sending **Full Size** and letting the app shrink it. Choose **Instagram** or **2048 px** instead.

Try it

Take one photo from your chapter 30 set, in a free film with no masks or heals, so it all stays free.

1. Open it, **swipe up** and tap **Add a Caption**. Write what and where, but keep it general.
2. Tap **Export**, then **Frame**, and choose **Border** with a 4:5 shape.
3. Turn on **Caption** and check that **Location** is off.
4. Set **Size** to **Instagram** and read the summary line.
5. Tap **Save to Photos**.
6. Back in the library, tap **Select**, pick three photos from the same set and tap **Collage**. Choose **Grid**, set the size to 3:4 "Instagram grid" and tap **Done**.

Chapter 34 comes back to location when it covers other people's privacy.

32. Keeping your photos safe



PHOTO U.S. National Archives, *Nitrate film stored in a brick vault, Navy Department*, 1935. U.S. National Archives.

Metal film cans and reels lie on their sides in a cramped brick vault. Some cans are dented and worn. Loose strips of film hang out of the cans and lie across them.

The U.S. National Archives took this photo on August 9, 1935. From 1935 to 1944, the Archives photographed how government records were kept before it took them in. This photo records how badly this film was kept.

The film in the cans is nitrate film. Early film had a clear plastic base made of cellulose nitrate. It burns very easily and very fast, and the fire is hard to put out. As it gets old, it gets sticky, then turns to brown powder. People used it for negatives and movies until the early 1950s.

Five offices owned these records, and all of the film sat in one crowded room. There was one copy, in one room, and one fire could have taken all of it. A photo is only as safe as the place you keep it.

Why one copy isn't enough

A photo on your phone is a file. If the phone is lost, stolen, broken or wiped, files that are only on it are gone.

A backup is a second copy of a file, kept somewhere else, so you can get the file back if the first copy is lost.

Sync keeps the same photos on all your devices. If you delete a photo on one device, sync deletes it on the others too. A backup keeps its copy even after you delete or break the original. So sync is not a backup.

The 3-2-1 rule

The 3-2-1 rule is a simple plan for your copies:

- **3 copies** of every photo you care about. That's the original plus two backups.
- **2 kinds of storage**, like the phone and a computer's drive or an external drive.
- **1 copy in another place**, away from your home. That can be a cloud service, or a drive at a friend's or family member's house. A cloud service is storage on a company's computers that you reach over the internet.

That last copy is for the brick vault problem, because a fire or a burglary takes everything in one room. In real life, that can be the phone, a cloud copy, and a computer or external drive you update now and then.

Keep the negative, share the print

Chapter 22 called a RAW file a digital negative, and a JPEG or HEIF a print. You share prints. You keep the negative safe, because you can make new prints from it later. A JPEG you posted can't become a negative again.

How much space you need

My 12 MP RAW files were about 11 to 16 MB each (chapter 22). One roll of 36 photos takes about 0.4 to 0.6 GB. 1,000 photos take about 11 to 16 GB.

Apple gives every Apple Account 5 GB of iCloud storage for free. That's roughly 300 to 450 RAW photos, but it's shared with iPhone backups, Apple Photos, mail and everything else in iCloud. Bigger plans cost money.

In Chobial

Where your photos are

Chobial keeps its photos in its own library, inside the app. A photo you take in Chobial doesn't go into Apple's Photos app unless you save it there. Every original stays as it was, with your film and edits in a small record next to it (chapters 22 and 26).

iCloud sync

1. Open **Settings** (in the camera, **Controls › Settings**, or at the top of the library) and find **iCloud**.
2. Check that **Sync Photos** is on. It sends each photo's original and its edit record. It's on by default and doesn't need Pro.

3. Read the status line under the switch, like "Uploading 3 photos" or "Up to date". If you're not signed in to iCloud, it asks you to sign in.

The other switch, **Sync Films & Settings**, keeps your films and camera setup on every device you sign in to.

The photos show up in Chobial on every iPhone and iPad with the same Apple Account, and nowhere else (not in Photos or iCloud Drive). A small iCloud mark in the corner of each photo shows if it's uploading, downloading or couldn't sync.

Every original takes iCloud storage, a RAW most of all. If a device's photos should stay on that device, turn off Sync Photos there.

Deleting

1. Open a photo and tap **Delete Photo** (the trash can) at the bottom. In the library, you can also tap **Select**, pick photos and tap **Delete**.
2. Chobial asks: "Delete this photo? The original file will be removed." Tap **Delete**.

Chobial has no Recently Deleted album, so a deleted photo is gone for good. With Sync Photos on, it's also deleted on every synced device and in iCloud. So sync protects you from a lost or broken phone, but not from deleting by mistake. A copy you saved to Photos earlier is a separate file, and it stays.

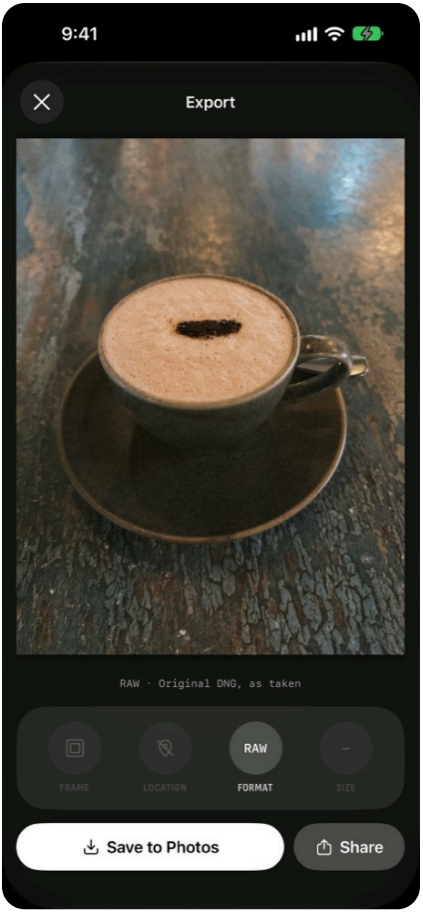
Deleting the Chobial app deletes its library on that phone, with every original and every edit. If Sync Photos was on and the photos had finished uploading, the iCloud copy stays. Install Chobial again with the same Apple Account and Sync Photos on, and they come back. If sync was off, or the photos hadn't uploaded, they're lost.

So before you delete the app, change phones or reset one, check that your photos are synced or saved out. The iPhone's own device backup (iCloud Backup, or a backup to a computer) includes Chobial's library too. That's one more copy.

Saving copies out

1. Open a photo and tap **Export**.
2. Pick a **Format**: **JPEG**, **HEIC** or **RAW**, then tap **Save to Photos** or **Share**.

One photo at a time as JPEG or HEIC in a free film is free. RAW export needs Pro. With **RAW**, **Save to Photos** saves a JPEG in your film with the original DNG attached, so Photos shows the film and keeps the DNG. **Share** sends the original file as it is, named like "Chobial Portra 2026-10-02 14.05.33.dng". In the share sheet, pick **Save to Files** to put it in iCloud Drive, on a USB drive or somewhere else. Other apps show that RAW without your film and edits, so keep the JPEG or HEIC too.



SCREENSHOT The export sheet with Format set to RAW and the Save to Photos and Share buttons

With Pro, you can save many at once. In the library, tap **Select**, pick photos and tap **Export**. The button says **Save 12 to Photos**, with your number.

Pro can also save every shot for you. Turn on **Settings › After Capture › Save to Photos**. Each photo goes to Photos as you take it, as a full-size HEIC in the loaded film. Add **Attach RAW File** to keep its DNG. Then any backup of your Photos library, like iCloud Photos, has your Chobial photos too.

> **On Android:** Chobial for Android is in a closed beta. It has no sync, so your photos stay on that phone, and uninstalling Chobial deletes them. Android's own app backup is limited to 25 MB per app, less than two RAW files. Your second copy comes from **Save to Gallery**, or **Settings › After Capture › Save to Gallery** with Pro. With RAW, it puts the JPEG and the DNG side by side. A Gallery backup, like Google Photos backup, can copy them on.

See it

My latte, shot in ProRAW on an iPhone 17 Pro Max, is the 15.7 MB file from chapter 22. I've developed that one file in six films. On the left, it's in Negative. On the right, it's in black and white with a red filter. Both prints come from the same RAW, and that RAW is still in my library. If I had kept only the first JPEG, the second print couldn't exist.



PHOTO PAIR Masnun's latte developed in Negative (latte-negative.jpg) / The same RAW developed in black and white with a red filter (latte-bw-red.jpg)

Common mistake

The trap is thinking "it's in Chobial" or "it's in iCloud" means it's backed up. Then you delete the app to free space, or trade in a phone with Sync Photos off. Or you delete a photo on the iPad, and it's gone from the iPhone too.

To spot it, check the status line in **Settings › iCloud** and the iCloud marks on your photos. Then ask where the second copy is, and where the third is.

To fix it, keep sync on and save the photos you care about out of the app, to Photos or with **Share › Save to Files**. Then keep a copy on a computer or drive.

Try it

A ten-minute backup check:

1. Open **Settings** and find the **iCloud** section. Check that **Sync Photos** is on, and read the status line.
2. In the library, find the iCloud mark on a few photos.
3. Pick your three best photos from chapter 30. Save each one to Photos as a JPEG, which is free in a free film. With Pro, select all three and export them as RAW.
4. Count your copies of one of those photos: in Chobial, in iCloud, in Photos, on a computer or on a drive. Check if any copy is outside your home.
5. If you have fewer than three copies, plan where the third one goes, and make it this week.

On Android, skip steps 1 and 2, and use **Save to Gallery**.

Chapter 33 is about printing your photos.

33. Printing

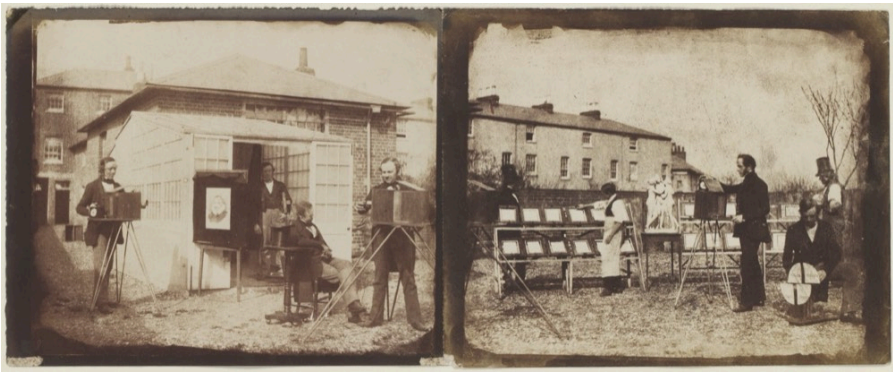


PHOTO William Henry Fox Talbot and Nicolaas Henneman (attributed), *The Reading Establishment*, 1846. The Metropolitan Museum of Art.

This sheet has two photos side by side, each about 18 × 22 cm. They show a yard behind brick houses in Reading, England, where Talbot's printing works was. The photos are thought to be by Talbot and his assistant Nicolaas Henneman.

In the left photo, one man copies a framed portrait with a wooden box camera, and another man makes a sitter's portrait. In the right photo, long tables and racks are covered with rows of small wooden printing frames, all out in the sun. A man in a white apron leans over to check one.

Those frames were the printer. A paper negative (chapter 22) was pressed against a sheet of paper made sensitive to light, inside a wooden frame with glass. The frame sat in the sun until the picture appeared. That's why the frames face the sky. Each print came out the same size as its negative. Printing was slow work, done by hand. Today you send a file in a minute, but the print still shows everything that's in the file.

Why a print shows mistakes your screen hides

On a phone, the photo is small and you look at it for a second or two. A print is often bigger, and people hold it close and look for longer. So missed focus, noise, halos, a crooked horizon and that spot you meant to heal all show more on paper.

Clipped highlights change too. The printer puts no ink where the photo is pure white, so you see the bare paper there, with no detail.

How many pixels a print needs

ppi means pixels per inch. It's how many pixels sit side by side in one inch (2.54 cm) of the print. People often say "dpi" for the same idea, though strictly, dpi counts the printer's ink dots.

A common rule is about 300 ppi for a print you hold in your hand, about 30 cm from your eyes. A poster on a wall is seen from a meter or two away, so about 150 to 200 ppi is common there.

To find the biggest print at 300 ppi, divide the pixels by 300. That gives inches. Multiply by 2.54 to get centimeters. Here's roughly what common paper sizes need at 300 ppi:

- 10 × 15 cm (about 4 × 6 in): about 1200 × 1800 pixels
- A4 (21 × 29.7 cm): about 2480 × 3508
- A3 (29.7 × 42 cm): about 3508 × 4961

And here's what Chobial's 4:3 iPhone photos give at 300 ppi. A 12 MP photo (4032 × 3024) prints at about 34 × 26 cm, which is already more than A4 needs. A 48 MP photo prints at about 68 × 51 cm. So 12 MP is plenty for everyday prints up to about A4. 48 MP helps for big prints, or when you've cropped a lot.

Cropping removes pixels. Crop a 12 MP photo to half its width and half its height, and you keep about 3 MP. That's about 17 × 13 cm at 300 ppi, enough for 10 × 15 cm but not for A4.

The shape of the paper

iPhone photos are 4:3 (3:4 upright). But 10 × 15 cm paper is 2:3, and A4 is a little longer than 3:4. When the shapes don't match, a lab does one of two things. It crops your photo to fill the paper, or it prints the whole photo with white strips. Labs give these choices different names, often "fill" and "fit" or "white border".

Paper and light

Most labs offer glossy and matte paper, and many offer one in between, often called luster, satin or semi-gloss. Glossy paper is shiny. It gives the deepest blacks and the strongest colors, but it shows fingerprints and the reflections of lamps and windows. Matte paper has no shine. Its blacks look a little softer and grayer, and you can see it well under any light. I like matte for black and white, and for prints I pass around.

Paper also looks darker than your screen. A phone screen makes its own light, and it can be very bright. Paper only reflects the light in the room. So a print usually looks darker, and often a little flatter, than the same photo on a bright screen. The darkest shadows tend to close up into black.

Edit with the screen brightness at about half, so you don't edit too dark. For the print copy, raise **Exposure** a little (for example +0.2 to +0.3) or lift **Shadows** a little (chapter 26). Night Shift and True Tone can make an iPhone screen's colors warmer, so turn them off while you judge color.

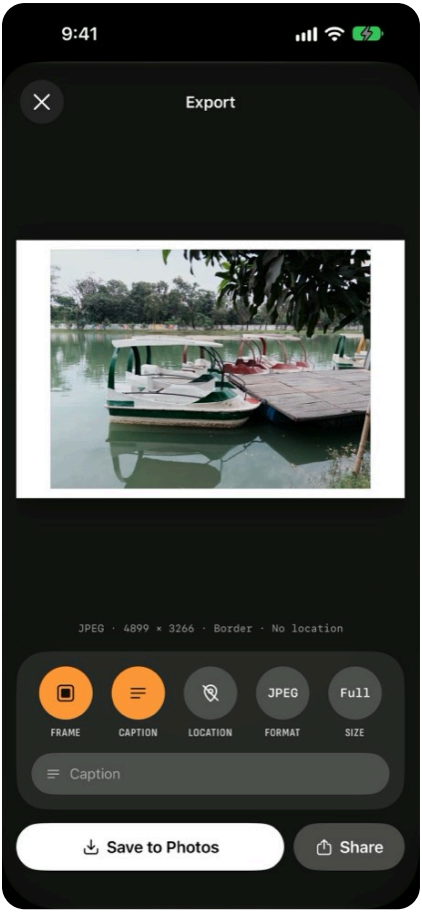
A test print is one small print you make first to check brightness and color. Make one before you print the rest.

Print shops and kiosks almost always take JPEG, and some don't take HEIC. So export JPEG for printing.

In Chobial

Chobial has no print button of its own. You save the photo, then print it another way.

1. Open a photo and tap **Export**. It's at the bottom left in the library's photo view, and at the top right while you edit.
2. Tap **Format** until it says **JPEG**.
3. Tap **Size** and pick **Full Size**. The tile reads **Full**. **2048 px** gives about 17 cm on the long side at 300 ppi, which is fine for 10 × 15 cm. **Instagram** is too small for most prints.
4. Tap **Frame** and pick **Border**. Then tap **Frame Settings**.
5. Set **Shape** to match the paper. For 10 × 15 cm, pick **2:3**. On a wide photo it shows as **3:2**. Set **Color** to **White**.
6. Read the summary line under the photo. It shows the format and the size in pixels, with the frame included. Divide the pixels by 300 to see how big you can print.
7. Tap **Save to Photos**, or **Share**.



SCREENSHOT The export sheet with the Border frame at 3:2 on white, Format JPEG, Size Full, and the summary line under the photo

The app's note says: "A shape pads the mat out around the photo and never crops it." The photo keeps all its pixels, and the file grows to hold the mat. So the lab gets a file in the paper's shape, and nothing is cut off.

For a big print, set the size before you shoot. Open **Controls › Settings**, and under **Capture**, set **Photo Size** to **Best Quality · 48MP** (chapter 17). It works for ProRAW, HEIF and JPEG photos. Plain RAW, sensor crops and bursts stay at 12 MP. Photo Size can't make an old photo bigger.

Film Card is a nice frame for prints too. It prints the film's settings under the photo, with a **Film Code**. That's a QR code that loads the film in Chobial. A friend can scan it from the print, if the print is big enough.

Then print your saved photos. Upload them to a print shop's app or website, take the files to a photo kiosk, or print at home. If you have a printer that works with AirPrint, the sheet that opens from **Share** usually has a **Print** action.

One photo at a time is free in a free film, with any frame and any size. Saving several at once needs Pro, and so do photos in Pro films or with masks or heals. Collages save at about 3000 pixels on the long side. At 300 ppi, that's about 25 cm (10 in), so a 4:5 collage (2400 × 3000) prints sharp at 20 × 25 cm.

> **On Android:** The button says **Save to Gallery** instead of **Save to Photos**. Print from your gallery app or your printer's own app, or upload to a print shop. What's offered depends on the phone. There's no AirPrint. **Photo Size** shows the sizes your lens really gives, like "Balanced · 50MP". Android is in a closed beta.

See it

Make two 10 × 15 cm prints of the same photo on the same paper. Print the first one exactly as edited on a screen at full brightness. For the second one, first raise **Exposure** about +0.3 and lift **Shadows**. Put both on a table in normal room light. The first one should look darker than on screen, and the second one closer to it.

Common mistake

You edit at full brightness, print, and get a dark, muddy print. To spot it, hold the print next to your phone. The shadows on paper are black blobs. To fix it, turn the screen brightness down to about half while you edit. Brighten the

print copy a little, and make one test print before the rest.

A second trap is sending an **Instagram**-size file to a lab for a big print. The print comes out soft. Always export **Full Size** for printing.

Try it

Print six photos from your roll at 10 × 15 cm.

1. Pick six keepers from your roll (chapter 30). To keep it free, pick photos in free films with no masks or heals.
2. Open the first photo. Turn the screen brightness down to about half and check the edit. Brighten it a little if it needs it.
3. Tap **Export**. Set **Format** to **JPEG** and **Size** to **Full Size**.
4. Tap **Frame** and pick **Border**. In **Frame Settings**, set **Shape** to **2:3** (**3:2** on a wide photo) and **Color** to **White**.
5. Read the summary line, then tap **Save to Photos**. Do the same for the other five. With Pro, you can select all six and export them at once.
6. Order 10 × 15 cm prints from a lab or kiosk, or print at home. If the lab asks, choose to print the whole photo without cropping.
7. When the prints arrive, lay them out in the order of your story and hold each one next to your phone. Note which ones came out too dark, for next time.

If you want more, tape the prints into a small notebook, one per page. That's your first zine. A zine is a small, cheap booklet you make yourself, often folded and stapled. You can also fold and cut one sheet of A4 or US Letter paper into a tiny 8-page booklet. There are many guides online for an "8-page mini zine".

PART 4

Photographing real life

34. Photographing people and places with respect



PHOTO Lewis W. Hine, *Italian Immigrant*, 1905. The Art Institute of Chicago.

This is the first chapter of Part 4. Each chapter in this part takes the basics from Parts 1 to 3 and uses them for one kind of photo. They go from portraits and street photos to food, night and buildings. Almost all of those photos

have other people in them, or other people's places. So before the "how", we start with the "may I".

You met Hine in chapters 16 and 31. He made this portrait at Ellis Island, the immigration station in New York harbor. Newcomers to the United States were checked there.

A young woman faces the camera, from about the waist up. A big light cloth with striped edges covers her head and falls over her shoulders like a hood. She wears a white blouse with lace down the front and two dark straps over her shoulders. Behind her, soft and out of focus, are tall windows and a railing at the right. Her face is calm and serious, and she looks straight into the lens.

She knows the photo is being taken. Cameras in 1905 were big boxes, slow to get ready, so she would have had to stop and stand for him. It feels like a picture made with her. That's what asking first looks like. She gave Hine her time, and today we don't even know her name. The title only says "Italian Immigrant".

Ask first

Most people say yes if you ask in a friendly way. Smile, show your phone and say what you like. "I like the light on your stall. May I take a photo?" If you don't share a language, point at the phone and raise your eyebrows. A nod or a shake of the head is clear in any language.

Afterwards, show them the photo and offer to send it. Talking to someone during a portrait is in chapter 35. Photos of people who don't know you're there, or aren't posing, are in chapter 37.

Accept "no"

Someone shakes their head, puts a hand up in front of their face, turns away or covers a child. All of these mean no.

Then lower the phone, smile, say thanks and move on. Don't argue, and don't take it "just once".

If someone sees that you took a photo and they're unhappy, show it to them. Then delete it while they watch. A photo you didn't keep costs you nothing. And when people trust photographers, it's easier for all of us to take photos.

Children

With a child, ask the parent or whoever is with them, and the child too. If no adult says yes, don't photograph children you don't know.

When you share a photo of a child, even your own family's, leave out things that tell strangers where to find them. That means the school name, a school uniform badge, the street and the location in the file. Photographing children and pets as a kind of photo is in chapter 42.

Private places and places with rules

Ask the people there or the staff before you take photos in private places. That means someone's home, a shop, a café, a place of worship, a hospital, a gym or a changing room.

Look for signs. Many museums, religious places, concerts and some shops say no photos, or no flash. Many military sites, some government buildings and some airports don't allow photos at all.

People at prayer, in hospital, at a funeral or at their worst moment need extra care. I put the camera down unless they want the photo.

Laws are different in each country

The rules about photographing people and places, and about posting those photos, are different in each country. Some places let you photograph people in public freely. Others protect a person's picture more, especially when you publish it.

This book can't tell you the law where you live, so check the local rules. Check them above all before you sell a photo of a person or use it in an ad. The habits in this chapter are good manners anywhere.

Posting is a second decision

Taking a photo and posting it are two different things. A friend may be happy with a photo on your phone and unhappy to see it on Instagram. Before you post, ask yourself if this person would be happy to see this photo online, with this caption. If you aren't sure, ask them, and ask before you tag them.

Look at strangers in the background too. If a face is clear and the moment is private or embarrassing, crop them out, remove them if they're small, or pick another photo.

Then there's the GPS position in the file (chapter 31). Think of a photo of a friend's home, a child's school or your host family's house. Its GPS position points to their door.

Chobial never records location. It has no location permission on iPhone or Android, so photos from Chobial's camera have no GPS position. Location only comes in with photos you import, from the phone's own camera app or another camera (chapter 29).

In Chobial

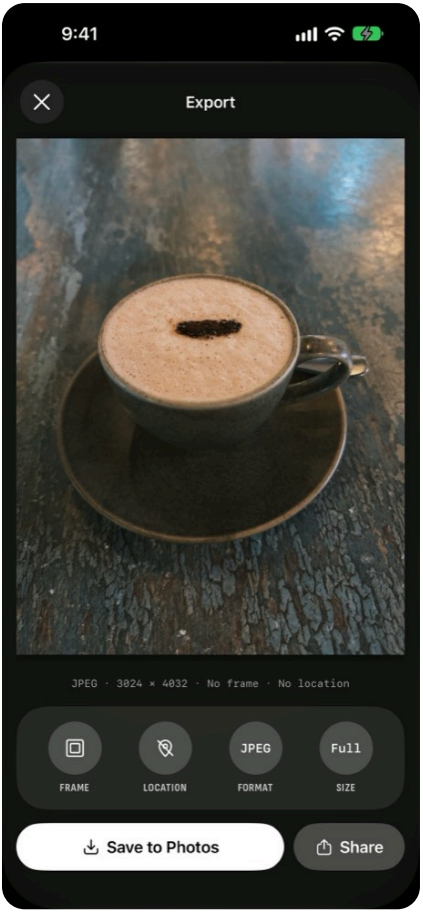
Check location before you share an imported photo:

1. Open the photo and tap **Export** (bottom left in the library's photo view, top right while editing).
2. Under the photo are tiles: **Frame**, **Caption** (only with a frame on), **Location**, **Format** and **Size**. A tile turns orange when it's on.
3. Make sure **Location** is off. The note under the tiles reminds you that Chobial never records where you take a photo, so this only matters for

imported photos. The summary line under the photo then ends in "No location", for example "JPEG · 4032 × 3024 · Label · No location".

4. With **Format** on **RAW**, **Location** is grayed out, and the original file goes out with any location still in it. Pick **JPEG** or **HEIC** instead.
5. Tap **Save to Photos** or **Share**.

If you make a collage, its **Caption** tab has a **Place** tile. It prints the town of the first photo with a location. Leave it off for photos of other people's homes.



SCREENSHOT The export sheet with the Location tile off and the summary line ending in "No location"

Remove a small stranger from the background with Heal:

1. Open the photo and tap **Edit**, then **Heal**. At the top, choose **Heal** (the other choice is **Clone**).
2. Pinch with two fingers to zoom in. One finger works on the photo.
3. Set **Size** a little bigger than the person, then tap or drag over them. A solid circle marks the spot. A dashed circle marks the source, which Chobial picks by itself.

4. If it looks wrong, tap the heal and drag the dashed circle to a better source, or raise **Feather**. **Remove Heal** deletes one heal, and **Remove All** clears every heal.

Heal is made for small things (chapter 27). Chobial has no AI "remove object" tool, and Heal copies only from your own photo. It works best on a small figure far away, against a plain wall, sky or grass. For someone near the edge, **Crop** (chapter 26) is quicker and cleaner. Chobial has no tool to blur faces.

Heal is free to try, but saving or sharing a photo with heals needs Chobial Pro. Without Pro, Chobial offers **Save Without Masks and Heals, Free**. That saves the photo without the heal, so the stranger stays in. For a free fix, use **Crop**.

Delete a photo when someone asks you to:

1. Open the photo, tap the trash button (**Delete Photo**) and confirm. Chobial removes the files at once, and there's no "Recently Deleted" in Chobial. With iCloud sync on, the delete reaches your other devices too (chapter 32).
2. Delete the copy you saved to Apple's Photos app. Photos keeps deleted photos in **Recently Deleted** for about 30 days, so empty it if you want the photo gone now.
3. Delete the copy in your backup (chapter 32), and any copy you sent on.

> **On Android:** The export buttons say **Save to Gallery** instead of **Save to Photos**. Chobial for Android doesn't ask for location either. Heal and its Pro rule are the same. There's no iCloud. On some phones, a copy you delete in the gallery app goes to its trash folder first. Chobial for Android is in a closed beta.

See it

Take a wide photo of a park, a square or a street, with a small passer-by at the edge of the background. Their face is clear, and the stranger is easy to recognize.

Then crop the stranger out with **Crop**, or remove them with **Heal** if they're small against a plain background. Compare the two versions. The photo still works, and now it's only about your subject.

Common mistake

The mistake is posting first and thinking later. It might be a party photo where a friend blinked, or a child in a school uniform. It might be your host's house with the location still in the file.

To spot it, stop before you tap **Share**. Look at every face and read the summary line. If you aren't sure someone would be happy to see the photo, ask them or crop them out. Keep **Location** off.

Try it

Ask three people for a photo, for example a shopkeeper, a street seller, a neighbor or a friend.

1. Tell them what you like about the scene and ask if you may take a photo.
2. If they say no, thank them and go.
3. If they say yes, take a few photos. Show them the best one on your screen.
4. Offer to send it. Open the photo, tap **Export**, then **Share**.
5. Pick one photo you'd like to post. In the export sheet, check that **Location** is off and read the summary line.
6. Write down what you said and how many people said yes.

35. Portraits



PHOTO Julia Margaret Cameron, *Julia Jackson*, 1867. The Metropolitan Museum of Art.

We've met Cameron twice already, in chapters 11 and 28. Julia Jackson was her niece, and she later became the mother of the writer Virginia Woolf.

The crop is close: her head, her neck and the top of her shoulders. She looks straight into the lens, calm and serious, with no smile. The camera is at her eye level, so we look neither up nor down at her. The light comes from the

right side of the picture. The side of her face on the right of the picture is lit, and the other side falls into deep shadow. That shadow gives the face its shape. The background is plain and dark, so your eye goes to her face.

This one frame is almost a whole portrait lesson. One soft light comes from the side. The camera is at her eye level, the crop is close and the background is plain. And her eyes look at us.

What makes portraits hard

People look at the eyes first (chapter 14). If the eyes are sharp, a soft ear is fine. If the nose is sharp and the eyes are soft, the photo looks wrong.

Most people also get stiff in front of a camera. A stiff face and a "camera smile" are usually a bigger problem than the settings. And a face shows bad light quickly. Noon top light puts dark shadows in the eye sockets (chapter 7). The phone's flash gives a flat, shiny face on a black background (chapter 16).

Light: start with a window

Window light is soft light when no direct sun comes in (chapter 7), and soft light is kind to faces. Put the person about one meter from the window, with the window to one side. That's side light, like in Cameron's photo. If the shadow side is too dark, hold white paper or a white towel there as a reflector (chapter 7).

Ask them to turn their face a little toward the window, so the light reaches both eyes. A catchlight is the small bright reflection of a light, like a window, in a person's eyes. I like to see one, because it makes the eyes look alive.

Turn off the room's lamps if they light the face too, or you'll get mixed light (chapter 15). Outdoors, open shade and golden hour work as well (chapter 7). Open shade on a sunny day is blue, and Shade white balance makes skin look natural there (chapter 15).

Where to stand

Put the camera at the person's eye level (chapter 6). If they sit, crouch or sit down too. When you stand over a seated person, they look small.

Pick the background before you start. A plain wall, a dark room or a hedge far away all work. Check for a pole that seems to grow out of their head. Then move the person away from the wall. The farther the background is, the softer it gets (chapter 11). Chobial has no Portrait mode and no background blur, so the blur has to come from the lens and from distance. A dark background makes the face stand out, as in Cameron's photo (figure and ground, chapter 6).

Frame tight for a face, or wider to show their shop or kitchen. Both work. For head and shoulders, a vertical frame is the usual choice, with the eyes about a third down from the top (chapter 3).

Which lens

2× is a good portrait lens (chapter 17). Step back and fill the frame with the face. The nose and ears are then at nearly the same distance from the phone. So the face looks the way it does in real life. At 0.5×, or very close at 1×, the nose looks big and the ears look small. At 2× the background also looks bigger and simpler, and its blur shows more.

My rough distances at 2× are about 1 meter for head and shoulders and about 2 meters for a photo from the waist up. That's on an iPhone whose 2× is about 48mm in full-frame terms.

On iPhones with a 48 MP main camera, 2× is a sensor crop of up to 12 MP. On a crop lens, Chobial takes ProRAW on the Pro iPhones and HEIF on the others (chapter 17). If your lens pill shows no 2×, use 1× and crop later, or use the telephoto if your phone has one.

Focus on the eyes

Focus on the eyes. When the face is turned a little, focus on the eye nearer the camera (chapter 14). At portrait distance, depth of field is usually deep enough for the whole face. The near eye matters most when you get close.

When Chobial's camera finds a person, it draws thin white corners around them. Tap inside the corners, and they turn green. Focus and exposure now follow that person, aimed at the middle of the face. While it follows, the camera keeps the shutter at 1/125 s or faster when it sets the exposure, so a small move doesn't blur. To stop following, tap somewhere else.

For focus exactly on the near eye, touch and hold on that eye for about half a second. That's **AE/AF LOCK** (chapter 19). A hold stops following, so lock again if either of you moves closer or farther.

Exposure for skin

The meter tries to make what it measures look middle gray (chapter 8). When you tap a face, the meter measures the skin. So light skin can come out a little too dark, and dark skin too bright and grayish.

After a tap, a sun shows beside the spot. Drag up to make the photo brighter, or down to make it darker. Each new tap puts EV back to ±0, so tap first, then drag (chapter 8). My starting points are about +0.3 to +0.7 EV for light skin and about −0.3 to −0.7 EV for dark skin. Then look at the face on the screen and adjust.

Turn on **Zebras** and watch the lit cheek and forehead. If stripes show on the skin, make the photo darker until they go. If the sun has gone, tap **EV** in the exposure line for the dial (chapter 8). Clipped skin can't come back (chapter 13).

Chobial shoots RAW by default, and 2× gives ProRAW on the Pro iPhones. With either one, you can brighten the dark side of a face later (chapter 26). Leave the flash off for window portraits.

A film to start with

Portrait (free) is my first choice. Its card says it suits "Faces, in any light", with "soft contrast, creamy skin and muted greens".

Soft Portrait (Pro) suits "Studio and window light", so it fits this chapter. Its card says "low contrast, muted color, open shadows". Open shadows means the dark side of the face keeps detail instead of going black.

Soft ("Portraits in soft daylight") and **Wedding** ("Faces and weddings, in any light") are two more free choices. Saving a photo in a Pro film needs Pro, but you can try any film in the editor first (chapter 24). Because the RAW is kept, you can change the film later.

Talking to the person

Set everything up before they sit down: the spot, the lens and the film. Then your eyes can be on them instead of the phone.

Talk the whole time. Ask about something they like, because people relax when they talk about their own things. Give small, clear directions, like "chin a little down" or "look at me", and show them with your own head. Show them a good frame early, too.

Take many photos. The best one often comes just after a laugh, or when they think you've finished (chapter 6). A smile isn't required, either. A serious face like Julia Jackson's can make a strong portrait.

Selfies and groups are in chapter 36, and people who aren't posing are in chapter 37. Children and pets have their own chapter, 42.

In Chobial

1. Tap **2** in the lens pill.
2. Swipe across the viewfinder until **Portrait** shows.
3. Turn on **Zebras** in **Controls › Guides › Zebras**.

4. Tap inside the white corners on the face. They turn green.
5. Drag the sun up or down to set EV for the skin.
6. For a close photo of a turned face, touch and hold on the near eye for **AE/AF LOCK**.
7. Talk to them and take many frames.

> **On Android:** There's no 2× sensor crop. The lens pill lists the phone's own lenses, like .6, 1, 3 and 5. For a 2× look, walk closer at 1× and crop, or use the telephoto. Following finds people by their faces, so a tap on the face works the same. Touch and hold for **AE/AF LOCK** works the same too. RAW is saved as DNG, and there's no ProRAW. Chobial for Android is in a closed beta.

See it

Ask a friend to sit in a chair indoors, and make two photos.

For the first photo, stand and point the phone down at them at 1×, with the busy room behind. They look small, and the room competes with the face.

For the second photo, move the chair away from the wall, with a window at their side. Crouch to their eye level and shoot at 2× from a step or two back. Now one side of the face is lit and the other is in soft shadow. The background is softer and simpler.

The photo below is by another photographer. It shows the light to look for in the second photo. The window lights the side of her face that's turned toward it, and the room behind her falls into dark shadow.



PHOTO Window light from the side and a dark, simple background (portrait-window-light.jpg). Andrew Neel, *Woman looking out window.* Unsplash, via Wikimedia Commons, CC0.

Common mistake

The common mistake is the silent photographer. You go quiet and fiddle with settings, and the person waits with a fixed smile.

You can spot it in your photos. Every frame has the same stiff smile and tight shoulders. The fix is to set up first, talk the whole time and keep shooting after the laugh.

Try it

1. Place a friend about a meter from a window, with the window at their side.
2. Get down to their eye level.
3. Tap **2** in the lens pill and load **Portrait**.

4. Tap the face, then drag the sun to set EV for the skin.
5. Take 10 frames while you talk.
6. Stand with the window behind you, ask them to face it, and take 2 more (front light).
7. Ask them to turn their back to the window and take 2 more (backlight).
8. Compare the side, front and back light, and pick the best frame.
9. Open it, tap **Edit**, then the **Film** tool, and tap **Soft Portrait**. Compare it with **Portrait**.

36. Selfies and group photos



PHOTO Robert Cornelius, *Self-portrait*, 1839. Library of Congress, Prints and Photographs Division.

Robert Cornelius, from Philadelphia in the United States, made this photo in 1839, the year photography was announced to the public. It's often called the first selfie, and it's one of the oldest surviving photos of a person.

It's a daguerreotype. A daguerreotype is an early kind of photo made right on a polished, silver-coated metal plate. There's no negative, so each one is the only copy. We see a young man from about the chest up, a little off-center. His arms are crossed and his hair is messy. A note on the back is said to call it "The first light Picture ever taken. 1839."

The story goes that he uncovered the lens, ran into the frame and sat still. Then he covered the lens again. The exposure took minutes, so he had to stay very still. That's the same trick as the self-timer today: set the camera, walk in, hold still. Most daguerreotypes are mirror images, with left and right swapped, because there's no negative to flip the picture back. So the first selfie was probably flipped, just like a picture from your front camera.

What makes selfies and groups hard

At arm's length the phone is close to your face. Up close, your nose is much nearer the lens than your ears, so the nose looks big and the ears look small (chapter 35). The front camera is also a wide lens, so it takes in a lot of background and your arm.

In a group, everyone has to look good at the same moment, and someone always blinks, looks away or talks.

Selfies with the front camera

Tap **flip** at the bottom right for the front camera (chapter 0). Tap it again to go back to the back lens you were on.

Hold the phone at full arm's length. A little above eye level is a common tip, and I like it.

The viewfinder shows the front camera mirrored, like a bathroom mirror, and Chobial saves the photo the same way you saw it (chapter 6). So your hair parting is on the side you know. But any writing behind you, like a sign or a T-shirt, comes out backward. To flip a photo, open it, tap **Edit**, then **Crop**, and tap **Mirror** (chapter 26).

The format label beside the island shows what each camera takes. Some front cameras have no RAW, and then Chobial takes HEIF (chapter 22). The photo still gets a film, and you can change the film later.

Now face the light. Turn toward a window, so soft front or side light falls on your face (chapters 7 and 35). With the sun or a window behind you, the meter makes your face dark (chapter 8). Tap your face and drag the sun up.

Front cameras have no flash, so the flash button disappears when you flip (chapter 16). Chobial has no screen flash either. In a dark room, find a lamp or a window to face.

A better selfie with the back camera

On most phones, the back cameras take sharper, cleaner photos than the front camera. So prop the phone on something steady and step back. Use the back camera at 2× from about 1 meter for head and shoulders, the same distance as in chapter 35. The catch is that you can't see yourself.

The first fix is the timer (chapter 18). Open **Controls**, the round button with sliders to the right of the shutter, and tap the **Timer** tile. Each tap goes Off, 3s, 10s, Off. With the timer set, "3s" or "10s" shows in orange above the shutter. Use 10 s, because it gives you time to walk into the photo.

Press the **shutter**. A big countdown shows over the picture, with a light tap each second, then one photo. Press the shutter again to cancel. The volume buttons and Camera Control start the timer too. So does Siri's "Take a photo with Chobial".

The second fix is the Apple Watch (chapter 18). Keep Chobial open on the iPhone, then open Chobial on the watch. The middle page shows what the phone sees, dimmed and small, behind a big **shutter**. Check the frame on your wrist and tap the **shutter**.

Group photos: arranging people

Get people close together, shoulder to shoulder. Each person should be able to see the lens with both eyes. If they can't see the lens, the camera can't see their face.

Put taller people at the back, with heads at different heights instead of one straight line. A long single line makes a thin photo with small faces. Two rows give you bigger faces.

Ask first, and check every face before you share (chapter 34).

Group photos: lens, eye level and focus

Step back and use 1×, or 2× if there's room. The 0.5× lens fits everyone in from close up. But people near the edges and corners can look stretched and wide. If you must use 0.5×, keep faces away from the edges.

Hold the phone at about the group's eye level (chapter 6). From far below, chins look big.

At group distances, depth of field on a phone is usually deep enough for two rows (chapter 11). Tap a face in the middle of the group.

If you're in the photo, lock before you join, so focus and exposure don't move to you as you walk in. Touch and hold on a face first for **AE/AF LOCK** (chapter 19). A tap anywhere else releases the lock. Switching lens or camera releases it too, so lock after you've chosen the camera.

Group photos: getting every eye open

My rule is that the more people there are, the more frames you need. Take several photos or a short burst, then pick the frame where every eye is open.

Hold the **shutter** for a burst (chapter 0). It takes up to about five 12 MP photos a second, with a counter above the shutter. Let go to stop.

You can also count "one, two, three" and shoot on three. Keep shooting just after, because people relax when they think it's over (chapter 35). Picking the best frame is in chapter 30.

The timer and the burst don't combine. If you hold the shutter while the timer counts, a burst starts at once and the count stops. The timer stays set until you change it or close the app, so press the shutter again for each frame. The watch has no burst, so each tap is one photo. A tap on the watch shoots at once, without the phone's timer, so you can stay in your place. For a few seconds to get ready, use the watch's own timer under its shutter (chapter 18). Then the phone shows the countdown, so everyone in the photo can see it.

Letting the group see itself on the iPhone Duo

While you shoot on the iPhone Duo's inner screen, the outer screen can show your subjects the picture. It's mirrored, in the loaded film, with the film's name under it. So people can fix their hair, and a group can check that everyone is in the frame.

Turn it on with the **Outer Screen** button next to **flip**. It's off until you turn it on, and "OUTER SCREEN ON" shows for a moment. The outer screen shows only the picture, without zebras, peaking or the loupe. It switches off by itself when the phone gets too hot. On the Duo, **flip** picks the front camera on the side of the fold you're looking at.

A film to start with

Portrait (free) is a safe start, as in chapter 35. Its card says it suits "Faces, in any light".

Eighties (free) suits "Family portraits indoors". Its card says "Old portrait negative: warm, gentle contrast and soft color."

Instant (Pro) suits "Parties and people up close". It has warm shadows and pale greens.

Wedding (free) suits "Faces and weddings, in any light".

Saving in a Pro film needs Pro, but you can try any film in the editor (chapter 24). The original is kept, so you can change the film later.

People who aren't posing are in chapter 37, night and city lights in chapter 41, and children and pets in chapter 42.

In Chobial

1. Put the phone on something steady at the group's eye level.
2. Tap **1** in the lens pill.
3. Swipe across the viewfinder until **Eighties** shows.
4. Touch and hold on a face in the middle of the group for **AE/AF LOCK**.
5. Open **Controls** and tap the **Timer** tile until it says 10s.
6. Press the **shutter** and walk into the photo.
7. For more frames, tap the **shutter** on your Apple Watch, so you can stay in the photo. Without a watch, walk back and press the **shutter** again for each frame.

> **On Android:** Chobial for Android is in a closed beta. There's no Apple Watch, Camera Control or Siri. The lens pill also has a **Front** choice, and **flip** works too. RAW is saved as DNG, and there's no ProRAW. Some front cameras have no RAW, and then Chobial takes HEIF or JPEG, with **NO RAW** in red on the label. Selfies are saved mirrored, as on iPhone. For a HEIF selfie, **Crop** shows **Mirror** already on, so tap it to flip the photo. A volume key takes a photo when you let go. With the timer set, it starts the count. Holding a volume key for about half a second locks focus and exposure instead, with no photo (chapter 19). The timer and the burst work the same as on iPhone. On a foldable, tabletop mode (chapter 18) is handy for groups. Half-fold the phone and stand it on a table, and the bottom half has the timer as **Off**, **3 s** and **10 s**. The **cover screen** can also show your subjects the picture, mirrored and in the film, while you shoot on the inner screen. The **Cover Screen** button beside flip turns it on. It's off until you turn it on.

See it

Make two selfies by the same window.

For the first one, use the front camera at arm's length. Hold it low, pointing up, with the window behind you. Your face comes out dark, your nose looks big and a bit of arm shows.

For the second one, stand the phone on a shelf about 1 meter away and use the back camera at 2×. Face the window and use the 10 s timer or the Apple Watch. Now the light is on your face, and your nose looks its real size.

Common mistake

The common mistake is one frame, then everyone leaves. At home you find that someone blinked, and the group has gone.

To spot it, check every face at full size before the group splits up. The fix is to shoot several frames or a short burst, then zoom in on the screen and check the eyes in each one.

Try it

1. Gather a group of friends or family and ask if you can take their photo.
2. Set the phone on something steady at their eye level.
3. Tap **1** in the lens pill, and load **Portrait** or **Eighties**.
4. Arrange the group in two rows, with taller people at the back. Check that everyone can see the lens.
5. Touch and hold on a face in the middle for **AE/AF LOCK**.
6. Set the **Timer** to 10s, press the **shutter** and walk into the photo.
7. Take 5 photos. Use the watch, or walk back and press the shutter for each one.
8. Open each photo, zoom in and check every pair of eyes. Keep the best one.
9. Now take a selfie the same way. Stand the phone about 1 meter away, tap **2**, face a window, and use the 10 s timer or the watch.

37. Street



PHOTO Alfred Stieglitz, *The Street, Fifth Avenue*, 1900–01 (photogravure, 1903–04). The Metropolitan Museum of Art.

Alfred Stieglitz, the photographer from chapters 6 and 18, took this photo on Fifth Avenue in New York in 1900–01. He printed it in his magazine *Camera Work* in 1903. This print is a photogravure from 1903–04. A photogravure is a print made by etching a photo into a metal plate and printing it with ink.

Snow covers the street, and mist fades the tall buildings at the back into gray. A long line of horse-drawn cabs goes back along the left side. In the middle of the street, one person in a long dark cape walks toward the camera, alone on the white snow. A dark horse stands in the near right corner.

The photo has layers (chapter 4). The horse is near, the walker is in the middle, and the cabs and buildings are at the back. The walker is dark against white snow, so figure and ground work (chapter 6). Nobody overlaps the walker. You get this kind of moment when you pick your spot and wait for people to move into place. We don't know how long Stieglitz waited for this one, but chapter 18 tells of him waiting in a storm for another photo.

Why street photos are hard

Street photography is photos of everyday life in public places, like streets, markets and stations. The people in them usually aren't posing.

The moment is short, and it won't come back. By the time you see it, it's over (chapter 6). People move, so a slow shutter gives motion blur (chapter 9). The light changes as you walk from sun into shade. Backgrounds get busy with signs, poles and cars. Many beginners also feel shy pointing a camera at strangers.

Asking first, accepting "no" and the laws in each country are all in chapter 34. In my view, you can take street photos openly. You don't need to hide.

Working quietly

Be calm and slow. My rule is to stand still in one place, because after a while people stop noticing you.

Set everything before you start, as in chapter 35. Then your eyes can stay on the street.

The volume buttons take a photo, and so do Camera Control clicks on iPhones that have it (chapter 18). They take the photo when you let go of the button.

Keep your fingers off the picture. A tap on the picture lets go of the lock (chapter 19), and a swipe across it changes the film (chapter 6). Use the **shutter** button or a volume button instead.

Hide the controls

Controls is the round button with sliders to the right of the shutter. Tap it or swipe up on the camera to open the panel. To put the panel away, swipe down, tap the black space around the picture, or tap **Controls** again (chapter 0).

With the panel away, the picture is clear. The **exposure line** under the Dynamic Island still shows your settings. Values you set are orange, and the camera's values are gray (chapter 12). So you can check that 1/250 is still set without opening anything.

Leave the flash Off. The flash button goes Off, Auto, On (chapter 0). If **FLASH** or **FLASH AUTO** shows in the exposure line, tap the flash button until it's Off.

Where to stand, and waiting for the moment

Chapter 6 gave you two ways to catch a moment. You can find the background and the frame, then wait for someone to walk into it. Or you can start shooting just before the moment.

For street, I like the first way. Pick a spot with good light and a clean background, like a lit wall, a shadow line or a crossing. A doorway gives you a frame within a frame (chapter 4). Then wait.

Look for someone dark against something bright, or bright against dark (chapter 6). Silhouettes against a bright street end work well. Try for layers too, like Stieglitz's horse, walker and cabs (chapter 4).

Hold the **shutter** for a burst of up to about five photos a second, and let go to stop (chapters 0 and 6). A burst helps with walking legs and a turning head. You pick the best frame later (chapter 30). Work the scene, too (chapter 6). Stay in your spot and take more than one photo.

Which lens to use

The **1×** lens is the main camera, and it's the usual street lens. On recent iPhones it's 24mm in full-frame terms. It takes in the person and the place, and it's the best lens in dim light (chapter 17).

On iPhones with a 48 MP main camera, **2×** is a sensor crop of up to 12 MP (chapter 17). With 2×, Chobial takes ProRAW on the Pro iPhones and HEIF on the others (chapter 35). Use 2× for a single person or a detail from a few steps back.

With **0.5×**, people near the edges look stretched (chapter 36), so keep them away from the edges.

I don't like shooting with a telephoto from far away. It can feel like spying, and the photo looks flat. If you get closer with 1×, the viewer feels like they're in the street.

At normal distances, a phone makes almost everything look sharp (chapters 11 and 21). If the focus is a little off, the person is still sharp.

Set the exposure before it happens

For people walking, use about 1/250 s. For running children and cyclists, use about 1/500 to 1/1000 s (chapter 9).

Tap the shutter value in the exposure line, or tap the **Shutter** tile in **Controls**. A dial opens across the bottom of the picture. Slide it to **1/250**. The value turns orange, and it stays set until you tap **Auto** on the dial or **Back to Auto** in the panel.

The camera keeps setting the ISO for you as the light changes (chapters 9 and 12). Dragging up or down on the picture changes EV, and that changes the ISO. In a dim street at 1/250 s, the ISO goes high and the photo gets noisy. If the ISO turns red, the camera can't reach the brightness the meter wants, and the photo comes out too dark.

Next, prefocus. Prefocus means setting the focus on a spot before your subject gets there. Set the shutter first. Then point at the spot where people will pass and touch and hold there for about half a second (chapter 19). Because you set the shutter yourself, the label says **AF LOCK**. Only the focus locks, so the brightness can still change with the light.

The lock stays when you move the phone, take photos or swipe to another film. A tap on the picture, a lens change or focusing by hand lets it go (chapter 19).

If you stand in one spot in even light, you can set both ISO and the shutter (chapter 12). Then the camera changes nothing. If you walk from shade into sun, the photo comes out far too bright. So my simple advice is to set only the shutter when you walk around.

Chobial takes RAW by default. A photo that's a bit too dark can be brightened later (chapter 26). But blur can't be fixed, and a part gone pure white is lost (chapter 13).

A film to start with

Press (free) is my first pick. Its card says it suits "Street and reportage". Reportage is photos that report real events, like a news photographer's. Press is "Classic press black and white: open shadows, bright skies and gritty grain." It's modeled on Kodak Tri-X 400 (chapter 25). The grain also hides the noise from a high ISO in dim streets (chapters 10 and 21).

Mono (free) is "Clean monochrome with an even tone and no grain." Its card says it suits "Clean light and simple scenes". I'd use it for a simple street picture, like a lone walker on snow.

For color, these free films work:

- **Chrome**: "Street and documentary, overcast or hard sun"
- **Snapshot**: "Street and everyday"
- **Projection**: "Overcast streets and moody interiors"

Night streets are in chapter 41.

Shoot a roll of one film

Tap the **Rolls** tile in **Controls** until it says **24** or **36** (chapter 24). The frame count, like 12/36, shows in the left ear beside the Dynamic Island. When the roll is finished, your latest photo says **ROLL DONE**, and the **Rolls** album shows its contact sheet.

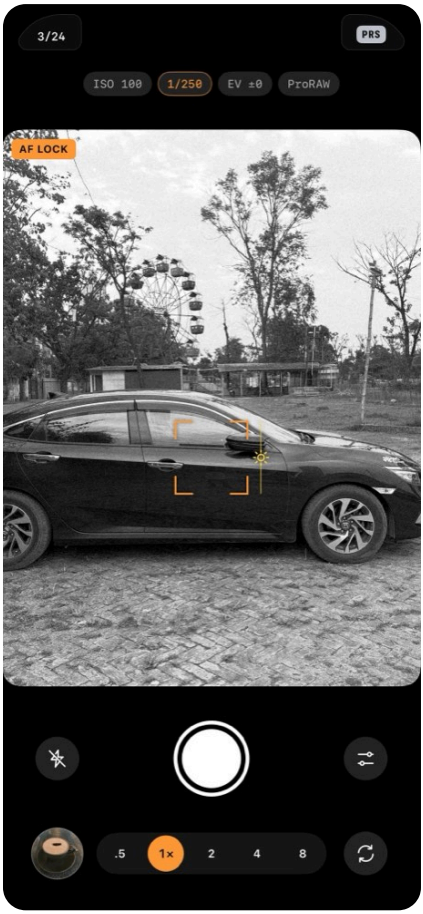
Chobial lets you change the film in the middle of a roll. Staying with one film is your own choice, like a film photographer with one roll.

With **Live Film** on, which is the default, a black-and-white film shows you the street in black and white as you shoot (chapter 23). That helps you see light, shadow and shapes (chapter 25). Chapter 45 has a full roll project.

In Chobial

1. Open **Controls** and tap the **Rolls** tile until it says **24**.
2. Swipe across the viewfinder until **Press** shows. You can also tap the film badge to the right of the Dynamic Island and pick it (chapter 6).
3. Tap **1** in the lens pill.
4. Tap the shutter value in the exposure line and slide the dial to **1/250**.
5. Check that the flash is Off.
6. Put the Controls panel away. Swipe down or tap **Controls**.
7. Point at the spot where people will pass. Touch and hold there for **AF LOCK**.

8. Wait. Take the photo with the **shutter** or a volume button. Hold the **shutter** for a burst when someone walks through.



SCREENSHOT The viewfinder in Press with the panel away, 1/250 in orange in the exposure line, AF LOCK in the top left and 3/24 in the left ear

On Android: Chobial for Android is in a closed beta. There's no Camera Control. A short press on a volume key takes a photo when you let go. Holding either volume key for about half a second locks the middle of the picture, with no photo (chapter 19). With the shutter set, that's **AF LOCK** too. So you can lock without touching the screen. There's no 2× sensor crop. The lens pill lists the phone's own lenses, like .6, 1, 3 and 5 (chapter 35). The **Shutter** and **ISO** tiles show only on a lens that lets apps set them. Some phones don't allow it on every lens (chapter 9). RAW is saved as DNG, and there's no ProRAW.

See it

Make two photos at the same street corner, in the same light, with someone walking past.

For the first photo, point and shoot as a person walks by, with no settings. In the shade the camera picks a slow shutter, so the walker is blurred. A pole cuts them, or they overlap another person, and the background is busy.

For the second photo, stand in one spot with 1/250 s set and **AF LOCK** on the spot. Wait until one person walks into a clear gap against a bright wall, dark against light. Shoot a short burst. The walker is sharp and stands apart.

The two photos below are by two other photographers, in two different places. On the left, a cyclist rides past too close and too fast, and the blur covers half the frame. On the right, one walker crosses a bright opening, dark against light, with nothing around him.



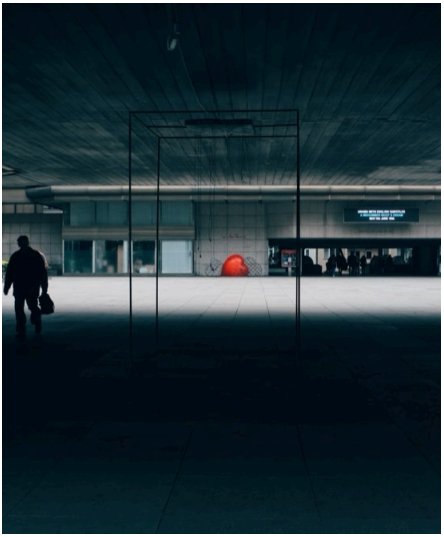


PHOTO PAIR A blurred cyclist across the front of the frame (street-blurred.jpg). Maxine yang, *Pedestrians Walking*. Unsplash, via Wikimedia Commons, CC0. / One dark walker against a bright opening (street-clear-gap.jpg). Stijn te Strake. Unsplash, via Wikimedia Commons, CC0.

Common mistake

The common mistake is chasing people. You walk fast after an interesting person and lift the phone too late. You get the back of their head, blurred. Or you change settings while the moment passes.

To spot it, look through your photos. They show backs, blur, tilted frames and busy backgrounds.

The fix is to pick the spot first. Set the shutter and the lock, then wait for people to come to you, like Stieglitz's walker.

Try it

Shoot a 24-frame roll on one street corner in about an hour, in Press.

1. Pick one place with good light and a clean background, like a lit wall, a doorway or a crossing.
2. Turn on a 24 roll, load **Press**, tap **1** and set the shutter to **1/250**.
3. Put the Controls panel away. Touch and hold on the spot for **AF LOCK**.
4. Stand still and wait. Shoot only when someone walks into the clear part of the frame. Use a burst for walking.
5. If someone notices and isn't happy, show them the photo and delete it (chapter 34).
6. When you see **ROLL DONE**, open the contact sheet in the **Rolls** album. Pick your best three (chapter 30).
7. If you like, tap **Develop Roll In…** and try the whole roll in **Mono** or **Chrome**.

38. Landscape

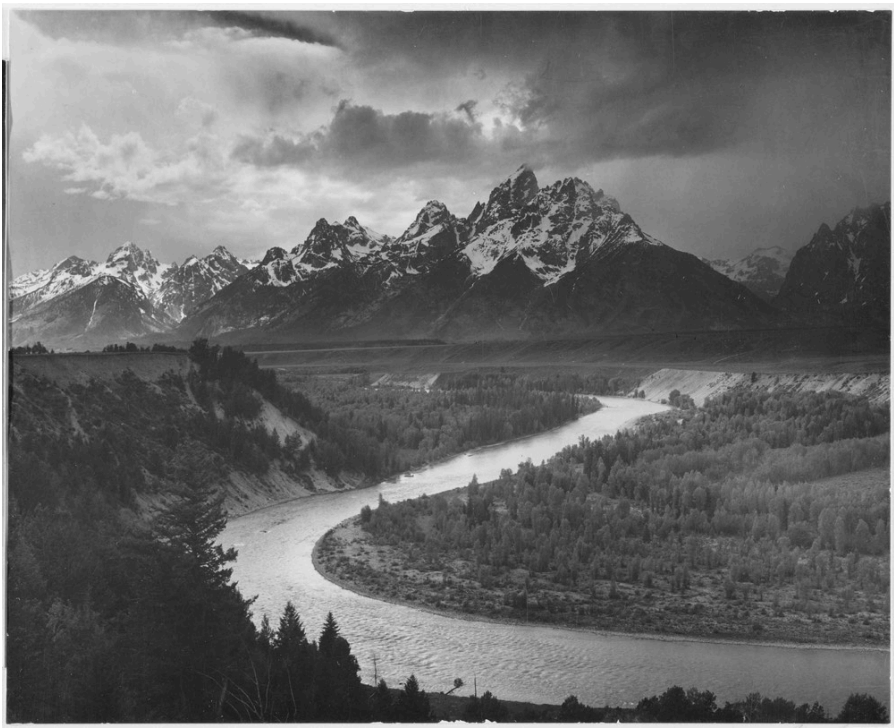


PHOTO Ansel Adams, *The Tetons and the Snake River*, 1942. National Archives, Ansel Adams Photographs of National Parks and Monuments (Mural Project).

Ansel Adams made this photo in 1942 in Grand Teton National Park, Wyoming, USA, for the Mural Project (chapters 13, 19 and 25). The National Park Service hired Adams to make photos for a mural in Washington. The mural was never made, because the project stopped when the US entered World War II. In 1977, this photo was one of 115 pictures on the Voyager Golden Record. That's a gold-plated disc sent into space on the two Voyager spacecraft.

The camera looks down on the Snake River from a high spot. The bright river makes a big S-shaped curve from the bottom of the frame toward the mountains. Dark trees fill the bottom left corner. In the middle, dark forest lies on both sides of the river. At the back, a row of jagged, snowy mountains crosses the frame, under dark storm clouds with bright breaks near the peaks.

The front, the middle and the back each have something in them (layers, chapter 4). The river is a leading line that carries your eye to the mountains. And the sky and the snow both keep their detail.

Why landscapes are hard

Landscape photography is photos of land, sea and sky, like mountains, fields, rivers and coasts. In this chapter, "landscape" means this kind of photo, unless I name the film called Landscape.

Your eyes see a huge, deep view, but a photo is a small flat rectangle. So a view that felt huge can come out as a thin strip of small, far-away things. Wide lenses make this worse. A mountain that looks big to your eye can look tiny in a 0.5× photo.

The sky is often much brighter than the land, and one exposure often can't keep both (dynamic range, chapter 13). Phones merge frames to help, but a bright sky can still clip.

And the light matters more than the place. The same view at noon and at golden hour looks like two different places.

Give the front, middle and back something

Put a rock, flowers, a path or water in front. Put trees, a field or a house in the middle, and mountains, hills or sky at the back. Then the photo looks deep (chapter 4). Plain grass in front does nothing, so get closer to something with shape or texture.

A river, path, road, fence or shoreline that runs from front to back leads the eye through the layers, like Adams's river (chapter 4).

Put the horizon on a third line (chapter 3). If the sky has big clouds or a colored sunset, put the horizon low and give the sky about two thirds. If the sky is plain white or gray, put the horizon high, or leave the sky out. Keep the horizon straight with Chobial's level (chapter 3). A tilted sea looks like it's draining out of the picture.

Go higher if you can. From a hill or a bridge, you can see the layers and the line of a river, like Adams did. Or go low, close to the foreground (chapter 6).

Shoot at the ends of the day

At golden hour, low warm side light makes long shadows. They show the shape of hills and the texture of fields and rock (chapter 7). The noon sun is top light, so hills look flat and colors look pale.

At sunrise or sunset, if you face the sun, the land often goes dark into a silhouette (chapter 6). With your back to the sun, the land gets warm front light.

Blue hour is dim and short, about 20 to 40 minutes, so the shutter gets slow. Rest the phone on something or use a tripod and the timer (chapters 7 and 18). Night is in chapter 41.

Check the sunset time and arrive early, because the good light can last only minutes.

On a cloudy day, the soft light is fine for forests, waterfalls and close details. Leave the white sky out of the frame. Rain, fog and snow are in chapter 43.

Which lens to use

0.5× is for a strong foreground. Hold the phone low, a hand's length to a step from the thing in front (chapter 4). Keep the phone level so trees at the edges don't lean (chapter 44). On Android this lens may be .6.

1× is the main camera, the best one on the phone and the best in dim light (chapter 17). Use it for the view as you see it.

The telephoto (3×, 4× or 5×, depending on the phone) picks out one mountain, one tree on a hill or rows of hills. It makes distant ridges look stacked close together. Haze is the thin mist you see over long distances. In haze, each farther ridge looks paler, and that shows depth. On iPhones with a 48 MP main camera, the **2×** sensor crop does a similar job (chapter 17). At blue hour, use 1×, because the telephoto is weaker in dim light.

At landscape distances, almost everything is sharp from near to far (chapters 11 and 21), except a very close foreground.

Keep the sky

Expose for the highlights (chapter 13). Chobial shoots RAW by default (chapter 26), so you can brighten dark land later. A sky gone pure white can't come back.

Turn on **Zebras** and **Histogram**. Stripes on the sky, or a histogram piled up at its right edge, mean the sky is clipping. Drag down on the picture to lower EV until the stripes leave the sky (chapter 8). Leave the sun itself out of this test, because it will always be white. Keep the clouds around it.

The meter makes the photo darker as you tilt up to more sky (chapter 19). To keep one brightness while you frame, touch and hold for **AE/AF LOCK**, then drag down. The lock stays while you move the phone and take more photos. A tap on the picture lets it go.

The simple way is to hold on a bright part of the sky, then frame. With a close foreground at 0.5×, hold on the thing in front instead, so the focus goes there.

Later, a **Sky** or **Linear** mask can darken only the sky (chapter 27), and **Highlights** can bring back cloud detail. Saving a photo with masks needs Pro.

In daylight, leave ISO and shutter to the camera. On a tripod at dusk, you can set the lowest ISO for the cleanest photo (chapter 10). If the shutter value turns red, the photo will be too dark, so raise the ISO or set the shutter too (chapter 12). Once you set ISO or the shutter, holding gives only **AF LOCK** (chapter 19). To get **AE/AF LOCK** back, tap **Auto** on both dials and hold again.

A film to start with

Landscape (free, under **Slide**) is my first pick. Its card says it suits "Sunrise, sunset and wide views". Its card describes deep blues and glowing reds and oranges. It's modeled on Fujichrome Velvia 50, a slide film. Slide film has narrow latitude, so expose for the highlights (chapter 24). In harsh noon sun, it can lose the shadows to black.

Chrome (free, also under **Slide**) suits "Street and documentary, overcast or hard sun". It.s "Muted documentary color with firm shadows and cyan-leaning skies." Cyan is a green-blue. It's the one for a gray day or hard midday sun, when Landscape would be too much.

Mono + R (free) suits "Dramatic skies and architecture". The red filter makes a blue sky dark and white clouds stand out (chapter 25). It gives a dark sky like the one in the Adams photo in chapter 25. A white or gray sky has no blue to darken, so it stays pale. **Mono + Ye** (free) has a yellow filter, which darkens the sky less.

With Live Film on, you watch the sky go dark in Mono + R before you shoot (chapter 23). You can also change the film later in **Edit** › **Film** (chapter 25). So shoot in Landscape and try Mono + R afterwards.

In Chobial

1. Open **Controls** › **Guides**. Turn on **Zebras**, **Histogram** and **Level**.
2. Swipe across the viewfinder until **Landscape** shows (badge LND).
3. Tap **.5** in the lens pill. Get low and close to something in front.

4. Line up the horizon until the level line turns orange.
5. Touch and hold on the thing in front for **AE/AF LOCK**.
6. Drag down until the zebra stripes leave the sky. If the sun beside the spot has gone, tap the **EV** value in the exposure line instead.
7. Take the photo. Then tap **1** or the telephoto and take the far view too.



SCREENSHOT The 0.5× viewfinder in Landscape, level line orange, histogram top right, no stripes on the sky, AE/AF LOCK top left

On Android: Chobial for Android is in a closed beta. The lens pill lists the phone's own lenses, like .6, 1, 3 and 5, with no 2× sensor crop. Holding either volume key for about half a second locks focus and exposure on the middle of the picture (chapter 19). The level is one straight line, and it still turns orange when it's level. The ISO and shutter tiles show only on lenses that let apps set them (chapter 9). RAW is saved as DNG, and there's no ProRAW. The films are the same.

See it

Make two photos from one spot on the same evening, of hills or a lake with a big sky.

For the first photo, stand tall with 0.5×, no lock and no zebras. You get a thin strip of small land across the middle, plain grass in front and a white sky. The horizon is in the middle and a little tilted.

For the second photo, come back at golden hour and load Landscape. Crouch with 0.5× close to rocks or flowers, with a path or a stream leading back. Keep the horizon low and level, and lower EV until the zebras leave the sky.

The two photos below are by two other photographers, in two different places, but they show the same difference. On the left, a foggy field has empty grass in front and a gray sky with no detail. On the right, a beach after sunset has rocks in front, a low, level horizon and a sky full of color.



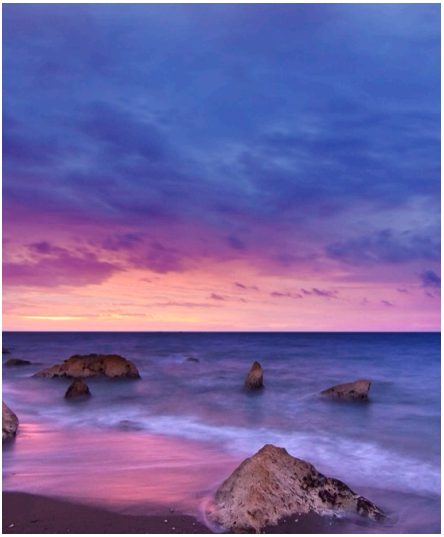


PHOTO PAIR A flat field, empty foreground, gray sky (landscape-flat.jpg). Liane Metzler. Unsplash, via Wikimedia Commons, CC0. / Rocks in front, a low level horizon, the sky kept (landscape-foreground.jpg). Quino Al, *Playa del Peñón del Cuervo sunset*. Unsplash, via Wikimedia Commons, CC0.

Common mistake

The common mistake is the tiny mountain. You tap .5 to fit a huge view in. You get a thin line of far-away hills under a white sky, with empty ground in front.

To spot it, look for a photo where nothing is big. In the viewfinder, zebra stripes cover the sky.

To fix it, fill the front with something close at 0.5×, or switch to 1× or the telephoto and frame only the mountain. Then lower EV until the sky keeps its clouds.

Try it

Pick one view at golden hour. Check the sunset time and arrive 30 minutes early.

1. Turn on **Zebras**, **Histogram** and **Level**. Load **Landscape**.
2. Photo 1: at 0.5×, low and close to something in front, with a line leading back. Put the horizon on a third.
3. Photo 2: at 1×, the view as you see it.
4. Photo 3: with the telephoto or 2×, only one hill or one tree.
5. Each time, lower EV until the stripes leave the sky.
6. At home, open the best one and tap **Edit** › **Film**. Try **Mono + R** and **Chrome**, then pick one and say in one sentence why.

If the sky is gray that day, try Mono + R anyway and see how little it changes (chapter 25).

39. Travel and the city



PHOTO Eugène Atget, *Cabaret de l'Homme Armé, Rue des Blancs-Manteaux*, 1900. Musée Carnavalet, Paris.

Eugène Atget, the photographer from chapter 29, made this photo in 1900. The Musée Carnavalet in Paris holds this print. The title means "the Armed Man" cabaret. A cabaret here is a small café or bar. Rue des Blancs-Manteaux is a street in Paris.

The photo shows a café front. Over the door, a carved sign shows a knight in armor sitting on a cannon. A waiter stands behind the glass door. One café front isn't the city. But Atget photographed Paris over many years. He made a long set of streets, shop signs, doorways and trades. Hundreds of photos like this one, put together, tell the city. That's the idea of this chapter. You tell a place with a set of photos.

Why travel photos are hard

You see a place once, and often at the wrong time of day. At noon the sun is top light (chapter 7), and the famous spots are full of crowds.

Everything is new, so you shoot everything. Then you come home with 400 photos that look like everybody's postcards. It's the famous building, straight on, from the spot where everyone stands.

You're often with family or friends who don't want to wait. And one photo can't hold a whole city.

Tell the place in a set

Think of the trip as a photo story (chapter 30). For a place, these are the parts I look for:

- **Wide:** the street, the square, or the view from a high spot. This is your establishing shot (chapter 30).
- **People:** the people who live and work there, at their work. Asking first is in chapter 34, and street technique is in chapter 37.
- **Details:** a door knocker, tiles, a worn step, hands on a market stall.
- **Food:** what you ate and where. Food photos are in chapter 40.
- **Signs:** shop signs, street names, menus and posters. They say where you are, in the local language. Atget's carved sign does this job.

Change the distance from one photo to the next: wide, then medium, then close (chapter 30).

Where to stand

Walk one or two streets away from the famous spot. The side streets often show how people live.

Go early in the morning. The light is soft and the streets are empty. Golden hour and blue hour are in chapter 7, and city lights at night are in chapter 41.

Climb a hill, a tower or a bridge for the wide shot. Use a doorway or an arch as a frame within a frame (chapter 4).

At the famous building, take the postcard photo anyway. Then look for your own photo of it. Try a detail, a reflection, or a person in front to show how big it is. Straight lines and looking up are in chapter 44.

Which lens to use

1× is the main camera. It's the best lens on the phone and the best in dim light (chapter 17). Use it for most of the set.

0.5× fits a narrow street, a small square or a room. People near the edges look stretched (chapter 36), and buildings lean if you tilt the phone (chapter 44). On Android this lens may be .6.

On iPhones with a 48 MP main camera, **2×** is a sensor crop of up to 12 MP (chapter 17). It's good for a detail or one person from a few steps back.

The telephoto is 3×, 4× or 5×, depending on the phone. It picks out a sign high on a wall, a detail across the street or a dome over the rooftops. It's weaker in dim light, so use 1× indoors and at dusk, as chapter 38 said for blue hour. For people, my view on the telephoto is in chapter 37.

Settings to set yourself

In daylight, leave ISO and shutter to the camera.

For people walking in a street or market, set the shutter to about 1/250 s (chapter 37). Tap the shutter value in the exposure line, or the **Shutter** tile in **Controls**, and slide the dial. The value turns orange, and the camera keeps setting the ISO. If the ISO turns red, the photo will come out too dark (chapter 37).

Touch and hold on the picture for about half a second to lock. With the shutter set, the label is **AF LOCK**, so only the focus locks. With both on Auto, you get **AE/AF LOCK** (chapter 19).

When a bright sky sits over a dark street, expose for the highlights. Drag down on the picture to lower EV until the zebra stripes leave the sky (chapters 13 and 38). Chobial shoots RAW by default, so you can brighten the dark street later (chapter 26).

Churches, museums and markets are often dim inside. Use 1×, and keep the flash Off. The flash button goes Off, Auto, On (chapter 0). Many museums and religious places say no photos, or no flash (chapter 34).

A wide strip with 65:24

65:24 is the XPan shape from chapter 2. Open **Controls** and tap **Frame** until it says **65:24**. The viewfinder darkens what falls outside the frame lines. Chobial still captures the whole sensor and saves the frame as a crop, so you can change it later. In the editor's **Crop**, use **Free**, because 65:24 isn't in the list.

Hold the phone sideways for a wide strip, like a skyline, a long market, a row of shopfronts or a river front. Hold it upright for a tall strip, like a narrow street between tall houses, or a tower. The grid divides the strip into thirds, so you can place things on its lines (chapter 5).

A roll a day

Tap the **Rolls** tile in **Controls**. Each tap goes **Off**, **24**, **36**, and round again. The frame count, like 12/24, shows in the left ear beside the Dynamic Island. Tap it to see the roll's card, like "12 of 24 taken · 12 left". When the roll is full, your latest photo says **ROLL DONE**, and the **Rolls** album shows its contact sheet.

A roll ends only when it's full. There's no button to end it early. So "a roll a day" is a habit you choose. Pick 24 for a quiet day and 36 for a big one. If you don't fill the roll, tomorrow's photos go on the same roll. Each full roll gives you one contact sheet, like a page of the trip.

Pack light, and note the place

Your phone is the whole kit. If you like, bring a small tripod for dusk (chapter 18). Bring a power bank too. That's a small battery that charges your phone. My 12 MP RAW files were about 11–16 MB each, so a roll of 36 takes about 0.4–0.6 GB (chapters 22 and 32). Make your backup each evening (chapter 32).

Chobial never records location. It has no location permission on iPhone or Android, so its photos carry no GPS position (chapters 31 and 34). Photograph the street sign as a note to yourself, or write the place in a caption later (chapter 31).

A film to start with

Holiday (free, badge **HOL**) is my first pick for a travel day in the sun. Its card says it suits "Holidays and sunny afternoons". It's modeled on Kodak Gold 200. That's a consumer color negative film, the kind people bought for holiday snaps (chapter 24). Holiday has some grain.

Postcard (Pro, badge **PCD**) is "Dense slide color: red survives, green does not." Its card says it suits "Bright color and travel", and it's under **Slide** in the Films list. It keeps reds at full strength, cuts greens to about half and pushes

yellow toward orange. Use it for red buses, red doors, painted signs and market stalls in bright sun. Parks and trees go dull, so skip it for a green park. Saving a photo in a Pro film needs Pro, but you can try any film for free in the viewfinder and editor.



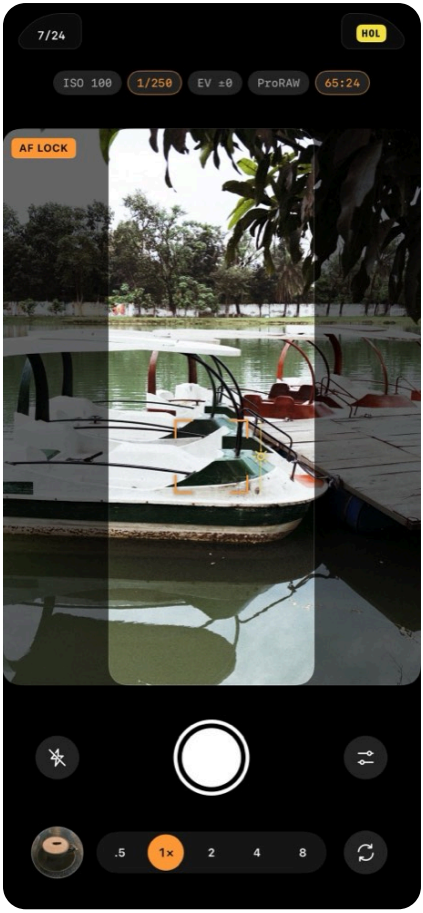
PHOTO Masnun's carousel in a park, in Postcard (carousel-postcard.jpg). iPhone Duo, 26mm, ƒ1.6, 1/200 s, ISO 40.

Aerial (free) suits "Cityscapes, haze and views from above". Try it for the view from the tower.

With **Live Film** on, which is the default, you see the street in the film as you shoot (chapter 23). The choice isn't final. You can change one photo in **Edit › Film**, or the whole roll with **Develop Roll In…**.

In Chobial

1. Open **Controls**. Tap the **Rolls** tile until it says **24**.
2. Swipe across the viewfinder until **Holiday** shows (badge HOL), or tap the film badge and pick it.
3. Tap **1** in the lens pill.
4. For people walking, tap the shutter value in the exposure line and slide the dial to **1/250**.
5. For a wide strip, tap **Frame** until it says **65:24**. Tap it again, or tap the frame in the exposure line, to go back to **4:3**.
6. Touch and hold on your subject. With the shutter set, the label is **AF LOCK**.
7. Take the photo with the **shutter** or a volume button. Check the frame count in the left ear.



SCREENSHOT The viewfinder in Holiday, 65:24 frame lines with the outside darkened, 1/250 in orange in the exposure line, 7/24 in the left ear

> **On Android:** Chobial for Android is in a closed beta. The lens pill lists the phone's own lenses, like .6, 1, 3 and 5, with no 2× sensor crop. Holding either volume key for about half a second locks focus and exposure on the middle of the picture, with no photo (chapter 19). With the shutter set, that's **AF LOCK** too. The **Shutter** and **ISO** tiles show only on lenses that let apps set them (chapter 9). RAW is saved as DNG, and there's no ProRAW. There's no iCloud sync, so your photos stay on that phone. Make your second copy with **Save to Gallery** (chapter 32). Rolls, frames and films are the same.

See it

Make two versions of the same street or market. For the first, stand where everyone stands at noon. Take one wide photo of the famous view, straight on. You get crowds, top light and nobody you'd remember.

For the second, make a set of six from the same place, in order, in Holiday. Start with the view from higher up. Then a stall holder at work, hands and goods on the stall, a cup of coffee or a snack, and the street sign. You can show the six as a collage.

Common mistake

The common mistake is the postcard pile. You come home with 400 photos of famous things. They're all wide, all from the spot where everyone stands, with nobody in them and nothing close.

To spot it, scroll your library. Every photo is the same distance and the same kind.

To fix it, take one medium and one close photo for every wide one of the same place. Photograph a person and a sign. A roll of 24 a day helps too, because a short roll makes you choose.

Try it

Shoot one day on one roll of 24 in Holiday, or in Postcard if the sun is bright. A shot list is a list of the photos you plan to take. Here's one for the day: about 4 wide, 6 people, 6 details, 2 food and 2 signs, and the rest are free.

1. Turn on a 24 roll, load **Holiday** and tap **1**.
2. Take your wide photos. Make one from up high, and one in **65:24**.
3. Set the shutter to **1/250** for people walking. Ask first (chapter 34).
4. Get close for the details, the food and the signs.
5. When you see **ROLL DONE**, open the contact sheet in the **Rolls** album.
6. Pick 6 in story order with **Select** and make a **Collage** (chapter 30).
7. If you like, tap **Develop Roll In…** and try **Postcard** or **Aerial**.

If you don't fill the roll, keep shooting tomorrow. The roll carries on.

40. Food and cafés



PHOTO Roger Fenton, *Still Life with Fruit*, 1860. The Metropolitan Museum of Art.

Roger Fenton was a British photographer who lived from 1819 to 1869. He's best known for his photos of the Crimean War in 1855. Around 1860 he made a series of still lifes of fruit and flowers. A still life is a picture of objects that don't move, like fruit, flowers or cups, arranged by the photographer. Fruit was a good subject for slow glass plates: it doesn't move.

Here, dark grapes sit in a heap in the middle, with a pineapple on the right. The fruit lies on a white crocheted cloth. Each grape has a small bright spot on its upper left side. So the light came from the upper left, from the side and a little above. It's soft, so the grapes, the pineapple skin and the lace all show their texture (chapter 7).

Fenton looked from a little above the table, and he chose every object on it. Your café table works the same way.

Why food photos are hard

Food doesn't wait. Foam on a cappuccino sinks and ice melts. Ten minutes later, the drawing in the foam is gone, and so is your patience.

Cafés mix their light. Daylight from the window and warm bulbs on the food give two colors on one plate (chapter 15).

Where to put the light

Window light is the easiest good light in a café (chapter 7). A window with no direct sun is a big soft light. Sit by the window, so its light wins over the bulbs.

Put the window beside the food. Side light shows texture, like the crust of bread or the foam on a coffee.

Or put the window behind the food. Backlight makes drinks and sauces glow at their edges. It also shows steam, best against a dark background. Steam fades in seconds, so be ready before the cup arrives. With backlight, the front of the plate can go dark. Hold up a white napkin or a menu card as a reflector (chapter 7), or brighten the shadows later (chapter 26).

Hard noon sun gives harsh shadows and glare. A thin curtain or a step back from the window softens it.

From above or from the side

Straight down suits flat food, like pizza, rice and curry, or a breakfast spread. The table turns into shapes (chapter 6). Food photographers call this a flat lay. A flat lay is a straight-down photo of things laid out on a table.

About 45°, roughly where your eyes are when you sit, suits most drinks and plates.

Low, almost from the side, suits tall food like a burger or a layered cake. From straight above, a burger turns into a round bun and you lose its layers. That's what usually works for me.

Clean the table

Wipe crumbs and coffee rings. Move phones, keys, receipts, sugar packets and the napkin holder out of the frame. Keep one or two things that belong, like a spoon or a hand on the cup. A hand makes it look like someone is about to eat. You're arranging things on purpose, the way Fenton did. If a face goes in the photo, ask first (chapter 34).

Which lens to use

1× is the main camera and the best in dim light (chapter 17). Use it for most café photos.

Very close at 1×, the near edge of the plate looks bigger than the far edge. Step back and use **2×**, and it looks more like you see it (chapter 17). On iPhones with a 48 MP main camera, 2× is a sensor crop of up to 12 MP.

Every lens has a closest distance it can focus (chapter 14). If nothing gets sharp, step back a little.

A phone keeps almost everything sharp at close range (chapter 21). For a blurred background, leave space behind the plate, or use Portrait mode (chapter 11).

Settings to set yourself

In a bright window seat, leave ISO and shutter to the camera. For my cappuccino indoors, it chose 1/50 s and ISO 800.

Food doesn't move, so a slow shutter is fine if the phone stays still. Rest your elbows on the table (chapter 18). Tap the shutter value in the exposure line and slide the dial to about 1/30 s. The value turns orange, and the camera keeps setting the ISO. A slower shutter lets it pick a lower ISO, with less noise (chapter 10). If the ISO turns red, the photo will come out too dark. For a barista pouring milk, use about 1/250 s.

Touch and hold on the food to lock. With both on Auto, the label is **AE/AF LOCK**. With the shutter set, you get **AF LOCK** (chapter 19).

Drag up or down on the picture to change EV (chapter 8). The meter aims for middle gray, so white foam can come out gray. Drag up. A dark cup on a dark table can come out too bright, so drag down. Turn on **Zebras** and keep the stripes off the foam (chapter 13). My cappuccino's cup came out too dark, so I brightened it later from the ProRAW (chapter 26).

Keep the flash **Off**. Phone flash is hard front light (chapter 16). It flattens the food and puts a shiny spot on sauces.

Warm café light

Chapter 15 said a café with warm lamps should look warm. White food, like rice or cream, shows a color cast first. Keep it a little warm, but not orange.

Open **Controls** and tap **WB**. Warm bulbs are about 2700–3000 K, and **Tungsten** is 3200 K. **Kelvin** opens a dial. Around 3500–4000 K is a good start. It takes away some orange and keeps a little warmth.

Gray Card makes a white plate white. Tap it, then tap a white napkin in the same light. It takes away the café's warmth too, but you can add it back in **Edit** › **Color** › **Temperature**.

Square and 4:5

Food photos are often square or 4:5, because Instagram's feed shows tall photos up to 4:5 (four wide, five tall).

For a square, open **Controls** and tap **Frame** until it says **1:1**. Chobial still captures the whole 4:3 picture, so you can change the crop later. The level fades when you point straight down, so line up the table's edge with the frame's edge.

The frame lines have no 4:5. Hold the phone upright and shoot in 4:3. Then tap **Edit** › **Crop** and pick **4:5**. It trims a little off the top and bottom.

A film to start with

Negative (Pro, badge **NEG**) is my café film. It's "Consumer negative film: hard contrast, teal greens, deep reds, warm highlights."



PHOTO Masnun's cappuccino in Negative (cappuccino-negative.jpg). iPhone 17 Pro Max, 24mm, ƒ1.78, 1/50 s, ISO 800.

There's nothing else in the frame, just the cup and the worn table. The shine at the top shows the light came from behind the cup.

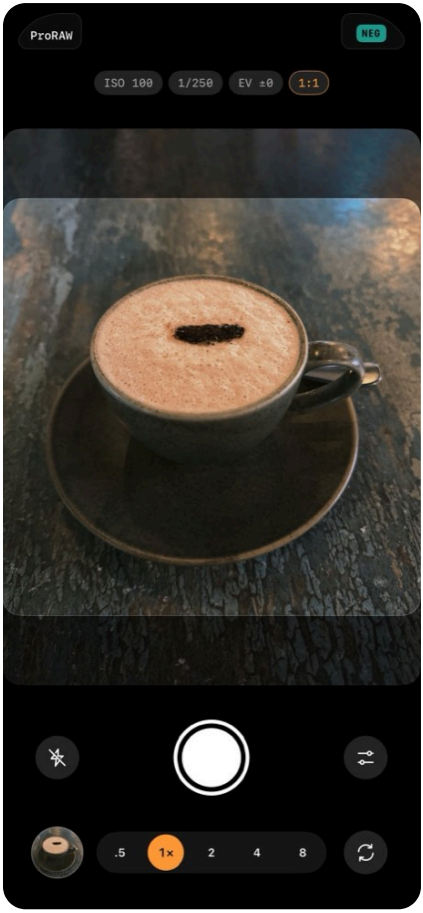
Chrome (free, badge **CHR**) is a free pick for a quieter cup. It has muted color and firm shadows.

Peel Apart (Pro, badge **PEL**) suits "Portraits and still life". Try it on a table you've set up like Fenton.

You can change the film later in **Edit › Film**. I walked my cappuccino through the editor in chapter 26.

In Chobial

1. Sit so the window is beside you or behind the cup.
2. Tap **1** in the lens pill. On iPhones with a 48 MP main camera, you can tap **2** from a step farther back.
3. Swipe across the viewfinder until **Negative** shows, or pick **Chrome** to save for free.
4. Open **Controls** and tap **Frame** until it says **1:1**. Leave **4:3** if you'll crop to 4:5 later.
5. Under warm bulbs, tap **WB**, pick **Kelvin** and set about 3500–4000 K.
6. Touch and hold on the food for **AE/AF LOCK**. Drag for EV, keeping the zebras off the foam.
7. Take one photo from above and one from about 45°.



SCREENSHOT The viewfinder in Negative with 1:1 frame lines, the outside darkened, a cappuccino in the square, 1:1 in the exposure line

> **On Android:** Chobial for Android is in a closed beta. The lens pill lists the phone's own lenses, like .6, 1, 3 and 5, with no 2× sensor crop. Holding either volume key for about half a second locks focus and exposure (chapter 19). The **Shutter** and **ISO** tiles show only on lenses that let apps set them (chapter 9). RAW is saved as DNG, with no ProRAW. Frame lines, WB, Crop and the films are the same.

See it

On the left is my latte as I shot it, in 4:3. At the back are a napkin holder and a menu stand. I forgot to move the napkin holder. On the right, I cropped it to 1:1. That cut off the top quarter, so only the cup, the spoon and the dark table are left.



PHOTO PAIR My latte in 4:3, napkins and menu at the back (latte-standard.jpg) / The same photo cropped to 1:1 (latte-square.jpg)

Common mistake

The common mistake is your own shadow on the food. You stand up to shoot straight down, with the window behind you. Your head and phone block the light, and a dark shadow falls across the plate.

To spot it, look for a dark patch on the plate that moves when you move.

To fix it, move so the window is beside you or across the table. Or hold the phone higher and use 2×. Don't fix it with the flash.

Try it

Take one drink or plate and ten minutes at a window seat.

1. Load **Negative** or **Chrome**.
2. Take three photos with the window beside you, behind the cup and behind you.
3. Take one straight down, one at about 45° and one low from the side.
4. Take one with **1:1** frame lines.
5. Clean the table and take it again.
6. In the editor, crop one to **4:5** and compare.

Night and city lights are in chapter 41.

41. Night and city lights



PHOTO Alfred Stieglitz, *An Icy Night, New York*, 1898. National Gallery of Art, Washington.

Alfred Stieglitz, the photographer from chapters 6, 18 and 37, was one of the first photographers to work at night. This is Fifth Avenue, at the edge of Central Park. A snowy path with footprints runs straight away from you. Snow sits on the bare trees, so their branches show as white lines against the dark and meet over the path like an arch. Far down the path, a row of street lamps glows, and each lamp has a soft glow around it in the misty air.

A lens maker's advertisement from 1903 said he made it at one in the morning in January 1898. It said the lens was wide open and the exposure took three minutes. The camera stood still, so nothing that stayed still blurred. And he didn't make night look like day. The lamps and the snow are bright, and the rest stays dark.

Why night photos are hard

There's little light. The camera has to pick a longer shutter, which blurs, or a higher ISO, which brings noise (chapters 9, 10 and 21).

A lamp is far brighter than the street around it. The meter aims for middle gray, so it can brighten the street, clip the lamps and turn the sky gray (chapters 8 and 13).

The light is mixed: orange lamps, white LEDs and colored signs (chapter 15). And your screen looks very bright in the dark, so check the histogram (chapter 13).

When to go and where to stand

Go at blue hour (chapter 7). The city lights are on, but the sky still has some color, so it stands apart from the black buildings. Later it goes black.



PHOTO Masnun's city at dusk, seen from above, in Saturated (city-dusk-saturated.jpg). iPhone Duo, 26mm, ƒ1.6, 1/121 s, ISO 50.

In my dusk photo, no lights are on yet, and there's still plenty of light. The phone used 1/121 s at ISO 50.

Stand where light falls: by lit shop fronts, under a street lamp, by a lit window ("give it light", chapter 21). Look for a row of lamps leading away, like Stieglitz's (chapter 4). People make good silhouettes against a lit window (chapter 6). A bridge or a high window shows the city's lights from above. Puddles reflect the lights too (chapter 43).

Go with a friend and keep a firm grip on your phone. Watch the traffic when you shoot from a roadside.

Which lens to use

Use **1×**. The main camera has the biggest sensor and the widest aperture, so it's the best in dim light (chapters 17 and 21). The telephoto gets noisy sooner. Save 0.5× for the dusk sky.

On iPhones with a 48 MP main camera, **2×** is a sensor crop of up to 12 MP, with no RAW (chapter 17). It's fine for a lit sign.

Settings to set yourself: hand-held

In the exposure line, a value the camera picks is gray and a value you set is orange. A value turns red when the camera can't reach the brightness the meter wants. Tap a value to open its dial.

For people or cars, raise the ISO before the shutter gets slower than about 1/30 s (chapter 12). A sharp, grainy photo beats a clean, blurry one (chapter 10). With only the ISO set, the shutter never goes slower than 1/8 s (chapter 21). If the shutter turns red, raise the ISO more. The dial's steps go up to ISO 12800, but each lens has its own range, so yours may stop lower.

Hold the phone with two hands, or lean on a lamp post (chapter 18).

Autofocus can hunt in the dark (chapter 14). Touch and hold on a bright edge, like a lit sign. With both on Auto, the label is **AE/AF LOCK**. With ISO or shutter set, it's **AF LOCK**, and only the focus locks (chapter 19). The hold puts EV back to ±0 unless both are set, so drag for EV afterwards.

Or leave both on Auto. ProRAW and HEIF get the phone's merging, so they come out cleaner than plain RAW (chapters 20 and 22).

Keep the flash **Off**. It lights only the nearest things (chapter 16). The far lights stay as they were, and a near face goes flat and bright.

Resting the phone and light trails

Rest the phone on a wall, a railing or a small tripod. Open **Controls** › **Timer** and pick **3s**, so your finger doesn't shake it (chapter 18).

Set the lowest ISO and a long shutter. With both set, the 1/8 s limit is gone. Chobial adds no limit of its own, so the dial goes as long as your phone and that lens allow. Its steps go up to 1 second, shown as 1". If a lens allows more, the last step is that lens's longest time. That's far from three minutes, but your phone's sensor is far more sensitive than Stieglitz's plate. Keep the gray EV at about ±0 or a bit below, so the lights don't clip (chapter 21).

A light trail is the line a moving light draws while the shutter is open. Set the shutter to 1/4 s or longer and wait for cars. The longer the time, the longer the line. Near cars draw long lines, and far ones draw short lines.

When you're done, tap **Back to Auto** in **Controls**. It hands every setting back to the camera.

Neon and bright signs

A neon sign is made of glowing colored glass tubes, or LED strips that look like them.

Turn on **Zebras** and **Histogram** in **Controls** › **Guides**. Drag down on the picture until the stripes leave the sign (chapter 13). Zebras measure overall brightness by default, so a deep red or blue sign can clip before stripes show. For signs, open **Settings** and set **Zebras on** to **Any color**. Then the stripes also show where one color clips. The histogram helps too. If a color trace hits the right edge, lower EV a little more.

Let the dark stay dark. A sign glows best against black.

Leave auto white balance for mixed light. If the orange lamps take over, tap **WB** and pick **Tungsten** or **Kelvin** (chapter 15). A little warmth looks right.

A film to start with

Night (free, badge **NGT**) is "Fast negative: warm shadows, cool highlights and heavy grain." It suits "Night and available light". It's modeled on Fujicolor Natura 1600. Chobial treats it as an ISO 800 film, so above ISO 800 its grain grows for each stop, like a pushed film (chapter 10). It's free to save.

Cinema (Pro, badge **CIN**) is "Motion picture film: flat, quiet color and shadows full of detail." It suits "Dusk, night and mixed light". It's modeled on Fuji Eterna motion picture film, and it has the lowest contrast of the built-in films. It lifts the deepest shadows most, and every color is about a fifth weaker. Saving in it needs Pro, but you can try it for free in the viewfinder and editor.

Tungsten (Pro, badge **TNG**) is the one built-in film with halation (chapter 23).

Swipe across the viewfinder to load a film. You can change it later in **Edit** › **Film** (chapter 24).

Halation in the editor

Night and Cinema have no halation, but you can add it to one photo. Tap **Edit**, then **Film**, and move **Halation**. It goes from 0 to 100%.

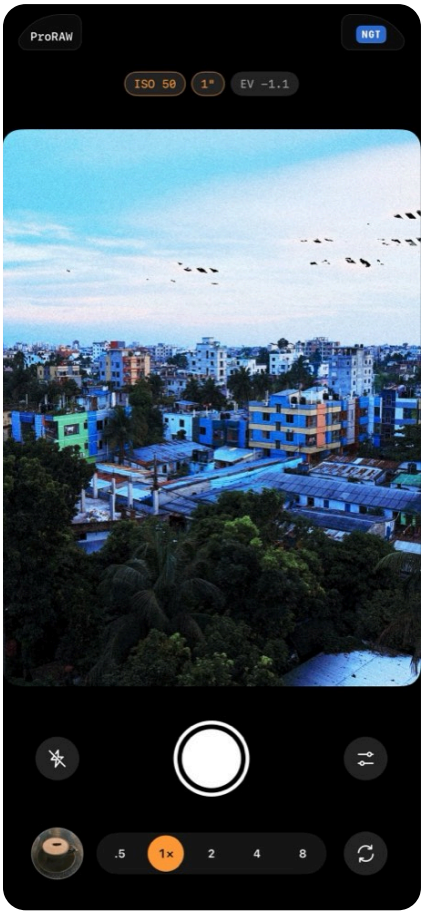
The glow starts at about 80% brightness, so lamps and signs glow while faces and the dark street don't. The light stays white, with a red-orange glow around it. The change is for this one photo, and the film itself stays the same.

Keep it light (chapter 23). **Bloom** is the white glow. Start with one of the two.

In Chobial

1. Tap **1** in the lens pill and swipe to **Night**.
2. Turn on **Zebras** and **Histogram** in **Controls** › **Guides**.
3. Hand-held: tap ISO and set 1600 or 3200.

4. Resting: pick **3s** in **Timer**, the lowest ISO and a long shutter.
5. Hold on a bright edge to lock focus, then drag down until the stripes leave the lights.
6. Tap **Back to Auto** when you're done.



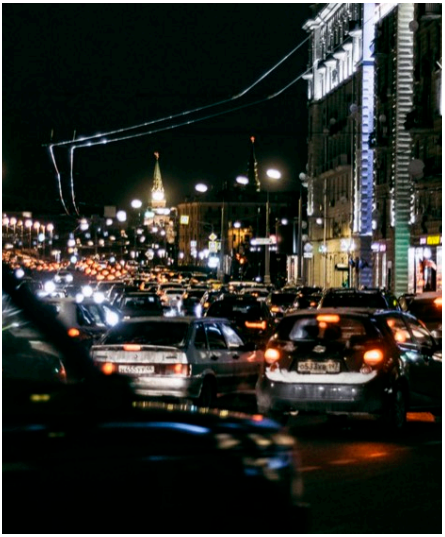
SCREENSHOT Night at a lit street, low ISO and 1" in orange, no zebras on the lamps

> **On Android:** Chobial for Android is in a closed beta. The lens pill lists the phone's own lenses, with no 2× sensor crop. **ISO** and **Shutter** show only on lenses that allow them (chapter 9). RAW is DNG, one frame, with no ProRAW. Holding either volume key for about half a second locks focus and exposure (chapter 19). A half-folded foldable on a table makes a good stand (chapter 18). The 1/8 s limit, the films, Halation and Back to Auto are the same.

See it

Rest the phone by a busy road after dark, in Night. For the first photo, use a fast shutter, like 1/125 s. The cars are sharp, and their lights are dots. For the second, set the lowest ISO and 1 second, or your dial's longest time. The lights draw long lines, and the road stays sharp.

The two photos below are by two other photographers, on two different roads. On the left, on a street in Moscow, every car is sharp, and the lights are points. On the right, a long exposure turns the cars into red and white lines.



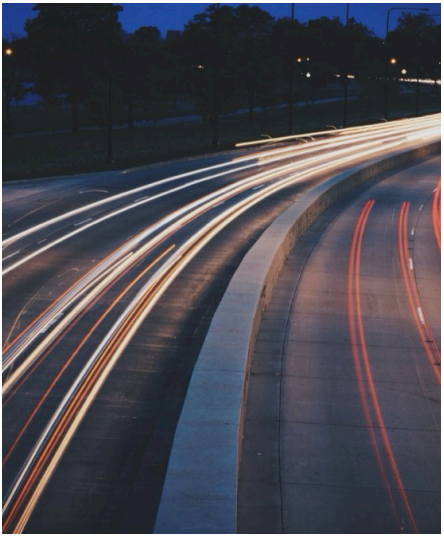


PHOTO PAIR Cars sharp, lights as dots (night-road-dots.jpg). Максим Барбухин (Maxim Barbukhin), *Moscow, Bolshaya Polyanka Street, evening northbound traffic*. Wikimedia Commons, CC0. / Light trails from a long shutter (night-road-trails.jpg). Caleb George, *Lines of Night Traffic*. Unsplash, via Wikimedia Commons, CC0.

Common mistake

You set a long shutter for light trails and go home. The next day, your photos blur, or the ISO turns red.

To spot it, look for an orange shutter value you didn't set today.

To fix it, tap **Back to Auto**. Make it the last step of every night walk.

Try it

Take a one-hour walk from sunset into night.

1. Load **Night** and tap **1**.
2. At blue hour, shoot one view every ten minutes as the sky goes black.
3. Hand-held at ISO 1600 or 3200, shoot a lit shop front.
4. Resting, shoot light trails on a road.

5. Drag EV down on a neon sign.
6. At home, try **Halation**, and develop one in **Cinema**.
7. Tap **Back to Auto**.

Pets and children are in chapter 42.

42. Pets and children



PHOTO Lewis W. Hine, *Little Mother, Pittsburgh*, 1909. The Art Institute of Chicago.

Lewis W. Hine, the photographer from chapters 16 and 31, took this photo from the children's own height. A girl hugs a baby, and the baby stares straight into the lens. A small boy stands at the right, looking down.

The title calls the girl a "little mother", because she's looking after a baby while she's still a child herself. The camera is at the children's eye level, so you meet the baby eye to eye. The baby's stare is what holds you. That's the first idea of this chapter: get down to their height.

Why pets and children are hard to photograph

Children and pets move fast and without warning. They don't take directions, and they get bored quickly. A dog won't "hold still" for long, however nicely you ask.

So get your settings ready first, and then wait for them.

Get down to their eye level

From standing height, you look down on them. They look small, and the background is the floor. At their eye level, the photo feels like you're with them, and the background is farther behind them (chapter 6).

Kneel, sit, or lie on the floor or the grass. For a small dog or a cat, that can mean the phone almost on the ground. Your knees may get dirty. That's part of the job.

Focus on the eyes (chapter 14). If the eyes are sharp, a soft ear or hand is fine. A catchlight makes the eyes look alive (chapter 35). Window light or open shade gives one (chapter 7).

Which lens to use

Indoors, use **1×**. The main camera has the biggest sensor, so it's the best in dim light (chapter 17).

On iPhones with a 48 MP main camera, **2×** is a sensor crop of up to 12 MP (chapter 17). It lets you stand a step back, so a pet or a child isn't crowded. Faces also look more natural than close up at 1×.

The telephoto (3×, 4× or 5×) lets you stay back from a shy cat, or from a child who stops playing when they see the phone. It gets less light than the main camera, so indoors the ISO climbs fast.

Following a pet or a child

When the camera finds a person or a pet, it draws thin white corners around them (chapter 14). On iPhone it looks for the faces and bodies of people, and the heads and bodies of cats and dogs. It's always on.

Tap inside the corners, and they turn green. Focus now follows that subject as it moves. If the subject turns away or hides, the camera keeps following for about two seconds. To stop, tap somewhere else in the picture, or touch and hold the picture (chapter 19). To follow again, tap inside the corners.

Among animals, only cats and dogs get corners. For a rabbit, a bird or a hamster, tap on it to focus, or hold for a lock.

While the camera follows a subject and sets the shutter itself, it keeps the shutter at 1/125 s or faster. That's quick enough for people and pets at a normal pace, but not for running (chapter 9). In a very dark room, the camera drops this limit, because the photo would be too dark.

Settings to set yourself

Running children and dogs need about 1/500 to 1/1000 s (chapter 9). In the exposure line, tap the shutter value, like "1/125", to open its dial. Or tap **Controls** and then the **Shutter** tile. Slide the dial to **1/500** for running. Go up to 1/1000 for jumping or fast running.

A value you set is orange, and a value the camera picks is gray. With only the shutter set, the camera keeps setting ISO. If the ISO turns red, the camera can't make the photo bright enough, so it will come out too dark. Then move to more light, or take a slower shutter like 1/250 s.

A fast shutter indoors means a high ISO, and so more noise (chapters 9, 10 and 12). A sharp, grainy photo beats a clean, blurry one (chapter 41).

The time you set stays set until you tap **Auto** or **Back to Auto** in **Controls**. Following still works with it.

To prefocus, touch and hold for about half a second where the dog will run (chapter 37). With the shutter set, the label is **AF LOCK**, and only the focus locks (chapter 19). With both on Auto, it's **AE/AF LOCK**. A hold stops following.

Dark fur can fool the meter. The meter aims for middle gray, so a black cat comes out gray. Drag down on the picture to about −1 EV (chapter 8). White fur can clip, so drag down a little or watch the zebras (chapter 13).

Keep the flash **Off**. Phone flash startles pets and children, and it gives red eye (chapter 16). In animals, the flash can bounce off the back of the eyes and make them glow. Use window light instead.

Burst, patience and play

Hold the shutter for a burst (chapters 0 and 18). It starts after about a third of a second, so a firm tap won't start one. It takes up to about five photos a second, at 12 MP. Let go to stop.

Start the burst just before the moment (chapter 6). A burst can't fix blur. If the shutter is too slow, every frame is blurred. So set 1/500 s first, then hold.

Pick the keeper later: eyes open, face sharp, best expression. Delete the near-duplicates (chapter 30).

Let them get used to you and the phone first. Sit on the floor and wait until they forget the phone is there. Then play. Throw a ball, or let a child do something they love, like drawing, building or jumping in puddles. A child doing something often makes a better photo than a "say cheese" smile, which tends to look stiff.

For a pet, ask a helper to hold a toy or a treat just above the phone. The pet looks at the treat, and so at the lens. A squeak or a strange sound gets you one look, and then the pet stops caring. So use it once, when you're ready.

Children and respect

With a child you don't know, ask the parent or whoever is with them, and ask the child too (chapter 34). If no adult says yes, don't take the photo. If a child says no or turns away, stop.

When you share a photo of a child, even your own family's, leave out what tells strangers where to find them. That means a school name, a uniform badge, a street, or the location in the file.

A film to start with

Snapshot (free, badge **SNP**) is my first pick. Its card says "Consumer negative: green-leaning color with cool, clean highlights." It suits "Street and everyday". It has grain. Chobial treats Snapshot as an ISO 400 film, so above ISO 400 its grain grows for each stop, like a pushed film (chapter 10). That fits a fast shutter indoors. It's free to save.

For a calm close-up of a child's face, try **Portrait** (free, badge **POR**). Its card says "Professional portrait negative: soft contrast, creamy skin and muted greens." Chapters 35 and 36 used it too.

Swipe across the viewfinder to load a film. You can change it later in **Edit** › **Film** (chapter 24).

In Chobial

1. Tap **1** in the lens pill, or **2** to stand a step back. Swipe to **Snapshot**.
2. Get down to their eye level.
3. Tap the shutter value and slide the dial to **1/500**.
4. Tap inside the white corners around the pet or child. They turn green.

5. Hold the shutter for a burst just before they move.
6. Tap **Back to Auto** in **Controls** when you're done.

> **On Android:** Chobial for Android is in a closed beta. Following finds people only, by their faces, and it doesn't follow pets. The 1/125 s limit works only for followed faces, with the shutter on Auto, on lenses that let apps set the exposure. For a pet, tap it to focus. Or set 1/500 s yourself, and hold a volume key or the screen to lock focus where the pet will be. Holding either volume key for about half a second locks focus and exposure (chapter 19). **Shutter** and **ISO** show only on lenses that allow them (chapter 9). The lens pill lists the phone's own lenses, like .6, 1, 3 and 5, with no 2× sensor crop. Burst works the same. RAW is saved as DNG, with no ProRAW.

See it

Shoot a pet or a child playing on the floor twice. For the first photo, stand and look down at 1×, on Auto. The subject looks small against the floor, and a moving paw is blurred. For the second, lie at their eye level, set 1/500 s and keep the best frame of a short burst. The eyes are sharp, and the background is farther away.

The two photos below are by two other photographers, of two different dogs. On the left, the camera looks down, so the floor fills the whole background and the dog lies flat against it. On the right, the camera is at the dog's level, the legs are frozen mid-run, and the fence behind is soft.

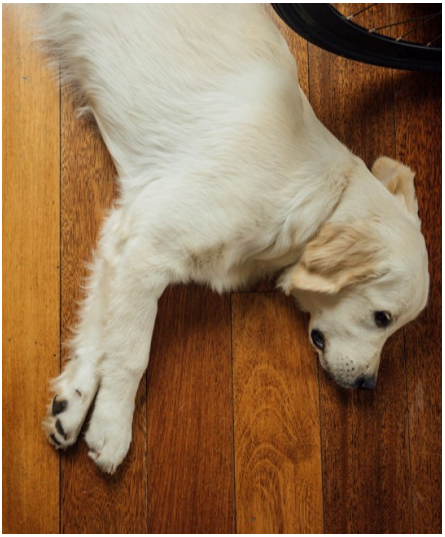




PHOTO PAIR A dog seen from above, the floor as the background (dog-from-above.jpg). Ana Martin. Unsplash, via Wikimedia Commons, CC0. / A dog at its eye level, frozen mid-run (dog-eye-level.jpg). Alexander Dummer. Unsplash, via Wikimedia Commons, CC0.

Common mistake

You shoot from standing height, and you trust the 1/125 s of following with a running pet or child.

To spot it, zoom in on the eyes and the paws or hands. They're smeared, and the photo looks down on the top of a head.

To fix it, get down to their eye level. Set the shutter to 1/500 s yourself before they start running. Tap **Back to Auto** when you're done.

Try it

Spend ten or fifteen minutes with a pet or a child you know. For a child, get the parent's yes first (chapter 34).

1. Load **Snapshot**.
2. Take three photos standing, then three at their eye level.

3. Play with a ball or a toy.
4. Set the shutter to 1/500 s, and tap inside the corners to follow.
5. Hold the shutter for a burst when they move.
6. At home, pick one keeper per burst. Compare the standing photos with the eye-level ones.
7. Tap **Back to Auto**.

Weather is in chapter 43.

43. Weather



PHOTO Alfred Stieglitz, *A Wet Day on the Boulevard, Paris*, 1894 (photogravure, 1897). National Gallery of Art, Washington.

Alfred Stieglitz is the photographer from chapters 6, 18, 37 and 41. He went out in a snowstorm (chapter 18) and at night (chapter 41). This time it's rain. The photo was published as a photogravure about 1897 (chapter 37).

A boulevard is a wide city street, often lined with trees. In this photo, the wet pavement shines like a mirror. People walk with umbrellas. At the far end, the street fades into wet haze. Reflections, umbrellas and low contrast in the distance are all in this chapter.

Why bad weather is worth going out in

Rain, fog and snow change a street you've seen a hundred times. Wet ground reflects, fog leaves simple shapes, and snow turns everything into a white page.

But each kind of weather fools the camera in its own way. The light is dim, or the scene is all bright, or the contrast is too hard. And your phone has to stay dry and warm.

Rain and reflections

Rain light is usually soft and dim, because clouds cover the sun. So the shutter gets slower, and the ISO climbs. Watch the exposure line. Use **1×**, because the main camera is the best in dim light (chapter 17).

Wet streets, puddles and wet cars reflect light and color. Reflections are strongest when you get low, close to the water, and look along it. A puddle can show a building, the sky or a person upside down. At night, wet streets reflect lamps and neon signs (chapter 41). After the rain is often as good as during it. The puddles stay, and you stay drier.

Look for umbrellas. A bright umbrella in a gray, wet street is an accent color (chapter 6). Many umbrellas seen from above make a pattern.

Falling drops show best against a dark background, with light behind or beside them (backlight). Tap the shutter value in the exposure line to open its dial. At about 1/60 s, the drops draw short streaks. At about 1/500 s or faster, they freeze as dots (chapter 9).

Keep the flash **Off**. It lights the nearest raindrops as bright blobs in front of everything (chapter 16).

Through a wet window, autofocus may pick the drops on the glass. Tap the far subject, or touch and hold to lock (chapter 19). Or make the drops your subject.

Fog

Fog scatters light, so contrast is low and colors are weak. Things farther away fade more, so each layer gets paler, like haze (chapter 38). Near things stay darker and sharper. The telephoto stacks those layers together (chapter

38).

Fog suits simple shapes: one tree, a lamp post, a person walking, a bridge fading away. All that empty gray is negative space (chapter 5). Put something dark and near in the frame for the fog to fade from.

The meter sees a bright gray scene and makes it middle gray (chapter 8). So fog can come out darker and dirtier than it looked. Tap the picture, then drag up to about +0.3 to +1 EV. Check the zebras, so the bright fog doesn't clip (chapter 13).

The histogram of fog is a narrow hill, with nothing at either edge. That's correct for fog, so leave it narrow.

Autofocus can hunt in fog (chapter 14). Tap a near, dark edge, or hold to lock.

Later, a little **Dehaze** in **Edit** › **Film** can bring back some shape (chapter 26). Too much removes the fog, and the fog was the point.

Fog is often thickest early in the morning, near water and in valleys, and it can clear fast.

Snow

The meter makes snow gray (chapter 8). Add about +1 EV, and sometimes up to +2 in bright sun. Check the zebras. Snow should be white, with a little texture and few stripes.

Snow in shade, or under a blue sky, goes blue (chapter 15). That can look nice and cold. For white snow, tap **WB** in **Controls** and try **Cloudy** or **Shade**. Chobial shoots RAW by default, so you can also fix **Temperature** later.

Low side light shows the texture of snow, like footprints and drifts (chapter 7). Flat noon light on snow shows almost no texture.

Snow is a white page. A dark person, tree or dog stands out as a strong shape, like Stieglitz's lone walker in chapter 37.

For falling snow, set the shutter to about 1/250 s or faster to freeze the flakes. A dark background shows the flakes.

Bright, hard sun

Midday sun is hard top light. It gives dark shadows, and dark eye sockets on faces (chapter 7).

You have four choices. Put a face in open shade (chapter 7). Put the sun behind or beside the subject. Use the hard shadows as the subject: strong shapes, lines and patterns. Or wait for later light.

Expose for the highlights (chapter 13). Turn on **Zebras**. Tap the picture, then drag down until the stripes leave the important bright parts. The sun itself, and glints on water or metal, may still clip. Lift **Shadows** later with the Light tool in the editor (chapter 26).

The screen is hard to see in bright sun. Turn the brightness up, shade the screen with your hand or body, and trust the zebras and histogram more than the screen. A phone left in hot sun may dim its screen or slow down to cool, so keep it in the shade between shots.

Keeping the phone safe

In rain, keep the phone in a pocket or a bag between shots. A clear zip bag or a cheap phone pouch helps. Stand under an awning or your umbrella, and dry your hands.

Water drops on the lens make blurry or smeary patches. Wipe the lens with a soft, dry cloth, like a glasses cloth, before each shot. Drops on the screen can act like taps, so shoot with a volume button. Camera Control works too, on the iPhone 16 and later models that have it, and so does an Apple Watch as a remote (chapter 18). A volume button also works with gloves on.

Don't charge a wet phone. Let it dry first.

Cold drains the battery faster. Keep the phone in an inside pocket, close to your body, and bring a power bank (chapter 39).

Condensation is tiny water drops that form on something cold when it meets warm, damp air, like on a cold glass. On a phone lens, it looks like fog. It happens when you come in from the cold. Let the phone warm up slowly in a bag or pocket, and wipe the lens.

At the beach, wipe off sand and salt water, and keep the phone in a bag.

And look after yourself. The ground gets slippery. In lightning, go inside. In fog, watch for traffic you can't see.

A film to start with

For rain, try **Projection** (free, badge **PRJ**). Its card says "Motion picture print: cool, silvery highlights and quiet reds." It has some grain. For black and white, **Noir** (Pro, badge **NOI**) suits "Night, rain and drama". Saving needs Pro, but you can try it for free.

For fog and snow, try **Mono** (free, badge **MNO**): "Clean monochrome with an even tone and no grain." For color on a gray day, **Cool** (free, badge **COL**) suits "Overcast days". If you want white snow to stay as it is, use **Standard** (free, badge **STD**).

For hard sun, try **Chrome** (free, badge **CHR**): "Muted documentary color with firm shadows and cyan-leaning skies."

Swipe across the viewfinder to load a film. You can change it later in **Edit** › **Film** (chapter 24).

In Chobial

1. Tap **1** in the lens pill and swipe to a film for the weather.
2. Turn on **Zebras** and **Histogram** in **Controls** › **Guides**.

3. For fog or snow, tap the picture, then drag up to +1.0 EV. For hard sun, tap and drag down until the stripes leave the bright parts.
4. For falling rain or snow, tap the shutter value and pick a time on the dial.
5. For blue snow, tap **WB** in **Controls** and pick **Cloudy** or **Shade**.
6. When you're done, tap the **EV** value and then **Reset**. Tap **Back to Auto** in **Controls**.

> **On Android:** Chobial for Android is in a closed beta. Holding a volume key for about half a second locks focus and exposure (chapter 19). There's no Camera Control or Apple Watch. The EV range comes from the phone, so some phones allow less than 3 stops either way. **ISO** and **Shutter** show only on lenses that allow them (chapter 9), and **WB** may be missing on some lenses. Zebras, Histogram, the films and Back to Auto are the same.

See it

Shoot the same snowy street twice. For the first photo, leave EV at ±0. The snow comes out dirty gray. For the second, drag up to +1.0 EV. The snow is white, and the footprints still show.

The two photos below are by two other photographers, in two different places. On the left, the snow came out blue-gray. On the right, the snow is white, and the trees and the walker still have detail.



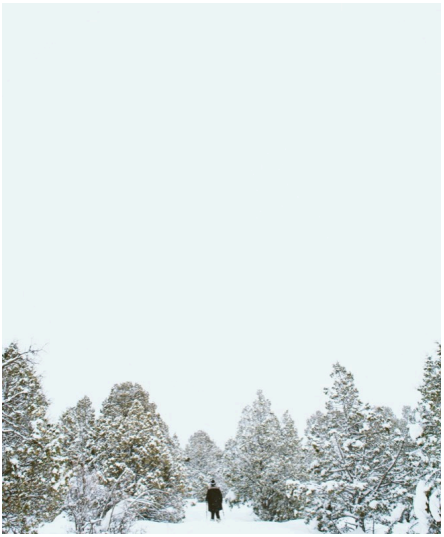


PHOTO PAIR Gray snow with a footprint (snow-gray.jpg). Paul Green, *A footprint in the snow.* Unsplash, via Wikimedia Commons, CC0. / White snow with detail kept (snow-white.jpg). Greg Rakozy, *Alone in the snow.* Unsplash, via Wikimedia Commons, CC0.

Common mistake

You shoot snow or fog on Auto, and it all comes out gray. The meter pulled the bright scene to middle gray.

To spot it, look at the histogram. It's bunched in the middle, and the snow looks dirty.

To fix it, drag up to about +1 EV and watch the zebras. Back indoors, reset EV, because it stays set photo after photo. Tap the **EV** value and then **Reset**, or tap the picture.

Try it

Next time the weather turns, go out for 20 minutes. Keep the phone in a pocket between shots.

1. Load **Projection** for rain, or **Mono** for fog or snow.

2. Turn on **Zebras**.
3. Shoot one reflection, with the phone low over a puddle.
4. Shoot one simple shape in fog or snow at +1 EV, and check the zebras.
5. At home, compare the photos, and dry the phone before you charge it.
6. Reset EV.

Architecture is in chapter 44.

44. Architecture

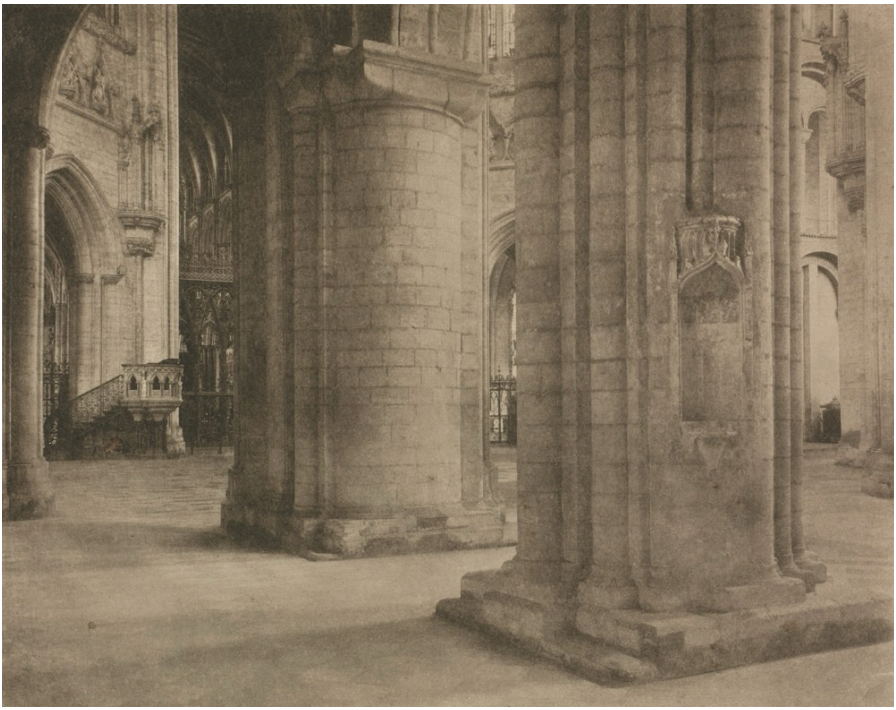


PHOTO Frederick H. Evans, *Ely Cathedral: Across Nave and Octagon*, 1903. The Cleveland Museum of Art.

Frederick H. Evans made chapter 26's photo too, in the same cathedral. This one was printed as a photogravure in Stieglitz's magazine, *Camera Work*, in 1903 (chapters 6 and 37). An octagon is a shape with eight sides. At Ely, the Octagon is the eight-sided space in the middle of the cathedral, under its central tower.

Two huge round stone pillars stand in front of you, built of rows of stone blocks. The base of the nearest one fills the lower right corner. Between them, you look across the cathedral to pointed arches, a carved stand with a

curving stair, and iron railings. A Gothic arch is a pointed arch, the kind in many old European churches.

Look at the sides of the pillars. They run straight up, parallel to the edges of the frame, and none of them lean. Upright lines stay parallel when the back of the camera stands upright, so Evans's camera wasn't tipped back. The light comes from the left, so it shows the texture of the stone (chapter 7). And the rows of blocks make a pattern.

Why buildings are hard to photograph

Buildings are tall, so you tilt the phone up to fit the top. Then the sides lean in (chapter 6). Tilt down from high up, and they lean out.

Often you can't step back far enough. The sky is often much brighter than the building. Inside, churches and halls are often dim (chapter 39).

The good news is that buildings don't move, so you have time to wait for light and people.

Keep the upright lines straight

Chapter 6 showed why tall buildings lean. Converging verticals are upright lines that lean toward each other in the photo, because the phone was tilted up or down.

Check the building's edges, or a door frame, against the grid's upright lines (chapter 6). If the edges lean in at the top, you're tilting up.

Chobial's **Level** measures only side-to-side tilt, so it can't show tilting up or down (chapter 3). Use the grid for this.

Keep the phone upright, and step back or use a wider lens until the building fits. You get extra street at the bottom. Crop it off later in **Edit** › **Crop** (chapter 26). Cropping throws away pixels (chapter 2), so don't crop down to a tiny part.

The straighten dial in **Crop** turns the whole photo, from –15° to +15° (chapter 26). That fixes a frame that tips to one side. But turning the photo can't make leaning lines stand upright again, so get them right when you shoot.

Or lean on purpose, a lot. From the foot of a tall building, tilt far back, and the building looks huge. A small lean looks like a mistake, and a big one looks like a choice (chapters 3 and 6).

Where to stand

Step back across the street or a square, so you don't need to tilt. Or go up to a window, a bridge or a balcony, about halfway up the building (chapter 6). From there the phone stays upright.

Stand straight in front for symmetry. From a corner, you see two sides, and the lines become diagonals running to vanishing points (chapter 4).

You don't always need the whole building. A door, a carved stone or a staircase can be the photo. An arch makes a frame within a frame (chapter 4).

Which lens to use

1×, the main camera, is the best in dim light. Use it when you can step back.

0.5×, the ultra-wide, fits a whole building or room when you can't step back. Hold it upright, or the edges lean hard. Things at the edges look stretched (chapter 17), which mostly matters for people.

The telephoto is 3×, 4× or 5×, depending on your iPhone. From far away, it fills the frame with a tower top or a row of windows. You tilt less from a distance, so the phone can stay upright. The telephoto gets less light, so use it outdoors in daylight (chapter 42).

Symmetry and patterns

For symmetry (chapter 3), face a door, an arch, a long hall or a church aisle. Put the middle between the two upright grid lines. Step left or right until both sides match, because almost-symmetry looks like a mistake.

Look for patterns (chapter 6): windows, balconies, columns, stairs. Fill the frame so the pattern runs off the edges. Shoot straight at it to keep the rows even. One open window breaks the pattern and gets the attention.

Looking up

Under a dome or a tall stairwell, or between tall buildings, point the phone straight up. Stand in the exact middle, and the lines meet in the center, often in symmetry. The level fades here (chapter 3), so center with the grid's crossing lines.

For a very low view, put the phone on the ground, screen up (chapter 6). Tap **flip** for the front camera, and set **Controls** › **Timer** to 3 or 10 seconds. The front camera mirrors the picture. A mirrored painted ceiling is usually fine, but writing comes out backward.

People for scale

Scale is how big something is compared with something else. A building alone has no size in a photo. A small person at the foot of a wall, a door or some stairs shows how big it is.

Find the frame, then wait for someone to walk into the spot (chapters 6 and 37).

Keep them small and far, so the building stays the subject. At 0.5×, keep them away from the edges (chapter 17).

In places of worship, be respectful and check if photos are allowed (chapter 34).

Light and settings to set yourself

Side light shows the texture of stone and brick, and golden hour warms it (chapter 7). At blue hour, look for buildings with their lights on (chapter 41).

For a bright sky behind a building, turn on **Zebras**. Tap the building, then drag down until the stripes leave the sky's important parts (chapter 13). Or hold for **AE/AF LOCK** (chapter 19). Chobial shoots RAW by default, so you can lift **Shadows** later in the Light tool (chapter 26).

In a dim church, use **1×** with the flash **Off** (chapter 39). Rest the phone on a ledge or a bench, and set **Controls** › **Timer** to **3s** (chapter 18). If you set ISO and shutter yourself, use the lowest ISO and a long shutter (chapter 41). Or leave both on Auto. Then ProRAW and HEIF use the phone's frame merging and come out cleaner than plain RAW (chapters 20 and 22).

When you're done, tap **Back to Auto** in **Controls** to hand every setting back to the camera.

A film to start with

Start with **Mono + R** (free, badge **MNR**): "Clean monochrome, red filter: dark skies, bright skin." It suits "Dramatic skies and architecture" and has no grain. The red filter darkens a blue sky, so a pale building stands out. On a white or gray sky, it does little (chapter 25).

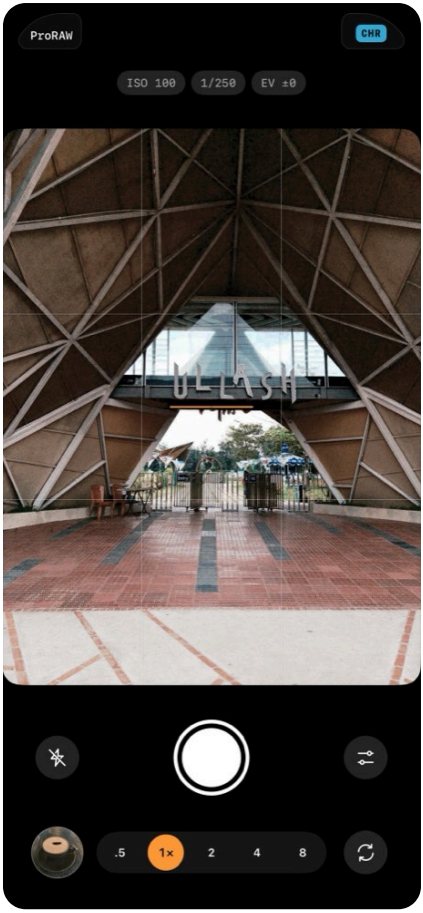
B&W + R (Pro, badge **BWR**) suits the same, and it has fine grain. Saving needs Pro, but you can try it for free.

Sepia (free, badge **SEP**) suits "Old buildings and quiet scenes". For a city from a tower, try **Aerial** (free, badge **AER**): "Cityscapes, haze and views from above".

Swipe across the viewfinder to load a film (chapter 24). With **Live Film** on, you see the sky go dark before you shoot (chapter 23).

In Chobial

1. Tap **Controls** › **Guides**, and turn on **Grid** and **Level** (chapter 3).
2. Tap **1** in the lens pill, or **.5** when you can't step back.
3. Hold the phone upright and compare the building's edges with the grid. If they lean in at the top, tilt back down, then step back or climb higher.
4. Wait for the level's line to turn orange, with a light click.
5. For a blue sky, swipe to **Mono + R**.
6. Later, in **Edit** › **Crop**, crop off the extra ground. Use the dial or **Auto** if the frame tips sideways. Tap the orange checkmark at the top right.



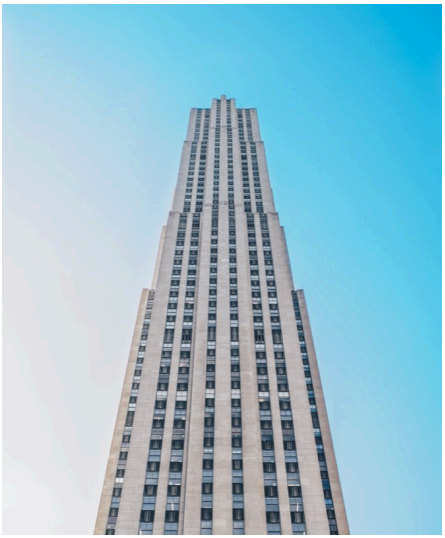
SCREENSHOT the viewfinder at 1× with the grid on, a building's edges parallel to the upright grid lines, and the level's line orange

> **On Android:** Chobial for Android is in a closed beta. The level is one straight line, with no degree number and no click, and it still turns orange (chapter 3). The lens pill lists your phone's lenses, so the ultra-wide may show as **.6**. **Auto** in Crop uses straight edges only, never a horizon. Holding a volume key for about half a second locks focus and exposure (chapter 19). The grid, films, straighten dial and Back to Auto are the same.

See it

Shoot one tall building twice. For the first photo, stand close and tilt up to fit the top. The building looks like it's falling backward. For the second, walk back across the street with the phone upright. The sides run parallel to the grid. Crop off the extra street later.

The two photos below show two different buildings. On the left, the camera tilts up at a New York tower, and its sides lean in toward the top. On the right, a survey photographer kept the camera upright across the street, so the sides of a Washington office building stay straight.



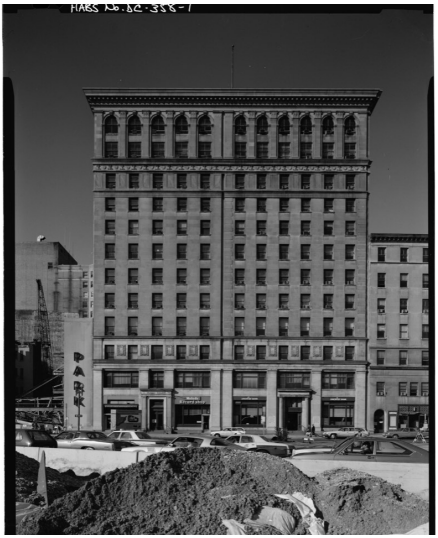


PHOTO PAIR Camera tilted up, sides lean in (building-tilted-up.jpg). Ian Schneider. Unsplash, via Wikimedia Commons, CC0. / Camera upright, straight sides (building-straight.jpg). Historic American Buildings Survey, Munsey Building, Washington, D.C. Library of Congress, public domain.

Common mistake

You tilt up a little to fit the top. The sides lean a bit, and the building seems to fall backward.

To spot it, compare the edges with the grid's upright lines or the frame's edges.

To fix it, keep the phone upright and step back, climb higher, or use 0.5× and crop the bottom. Or tilt a lot, on purpose. The straighten dial won't fix it, because it only turns the whole photo.

Try it

Pick a building you pass every day. Give it 20 minutes.

1. Turn on **Grid** and **Level**. Load **Mono + R**, or **Chrome** (free, badge **CHR**) on a gray day.
2. Take one upright photo with straight lines.
3. Take one straight up, from the middle.
4. Take one detail that runs off the edges.
5. Take one with a person for scale. Find the spot and wait.
6. At home, crop the upright photo's bottom in **Edit** › **Crop**, and pick your best.

The final project, shooting a roll, is in chapter 45.

The end of the book

45. Final project: shoot a roll



PHOTO Eadweard Muybridge, *Attitudes of Animals in Motion*, 1879, printed 1881. The Metropolitan Museum of Art.

You met Muybridge in chapter 9. This card comes from the same kind of work, a year later. It has twelve small photos of one man on a horse, in three rows of four. The rider wears a bowler hat, a round, hard hat. Each frame has its number, 1 to 12, in a corner.

Along the bottom of every frame is a row of numbered markers on the track. They show how far the horse moved between frames. Read the frames in order, and the horse's legs move through its stride.

To me, this card looks just like a contact sheet. It has one subject, one session and a set number of frames in rows. You read it frame by frame to find the best one. That's what you'll do with your own roll.

Why I like shooting a roll

A roll of film had a set number of frames, often 24 or 36. Film shooters chose one film before going out and kept it for the whole roll (chapter 24). Each frame cost money, so they waited before pressing the shutter. Your phone has room for thousands of photos, so it's easy to shoot without thinking.

I think a short roll makes you choose. With 24 frames, you look longer and shoot less. With one film for the day, you stop changing looks, so you look at the light and the subject instead. A roll also has an end, and the end gives you one page to look at: the contact sheet.

How a roll works in Chobial

Rolls are off until you turn them on with the **Rolls** tile in **Controls**. Each tap goes **Off**, **24**, **36**, and round again. Every photo uses one frame, and a burst uses one frame for each photo in it.

The frame count, like 12/24, shows in the left ear beside the Dynamic Island. Phones without the island show it in the exposure line. Tap the count to see the roll's card, like "12 of 24 taken · 12 left".

A roll ends only when it's full, and there's no button to end it early. If you don't fill it today, tomorrow's photos go on the same roll. So plan to fill it in one day. A roll also keeps the size it started with. If you switch from 24 to 36 partway, the new size starts with the next roll.

Chobial lets you change the film mid-roll, so staying with one film is your choice (chapter 37). There's a practical reason to stay. If every frame is in one film, the contact sheet prints that film's name along the edges. Otherwise it prints how many films, like "3 films".

When the last frame is taken, the photo button says **ROLL DONE**. Tap it, and the library opens with the roll's contact sheet. Later, you'll find it in the library's **Rolls** album. The next photo you take starts a new roll by itself.

What Chobial's contact sheet shows

The sheet looks like a real lab's. Black film strips sit on a 4:5 page, the shape of an 8 × 10 inch sheet. Sprocket holes run along both edges. Sprocket holes are the small square holes along the edges of 35 mm film.

A roll of 24 is cut into 6 strips of 4 frames. Each frame has its number under it, and each strip ends with the date, like a film camera's orange date stamp. The title is the roll's number, like "Roll 3".

The contact sheet is one picture, so you can't tap a frame to open it (chapter 30). Write down the frame numbers you like, then find those photos in the library. If you delete a photo from the roll, its place on the sheet stays blank, like a spent frame on film.

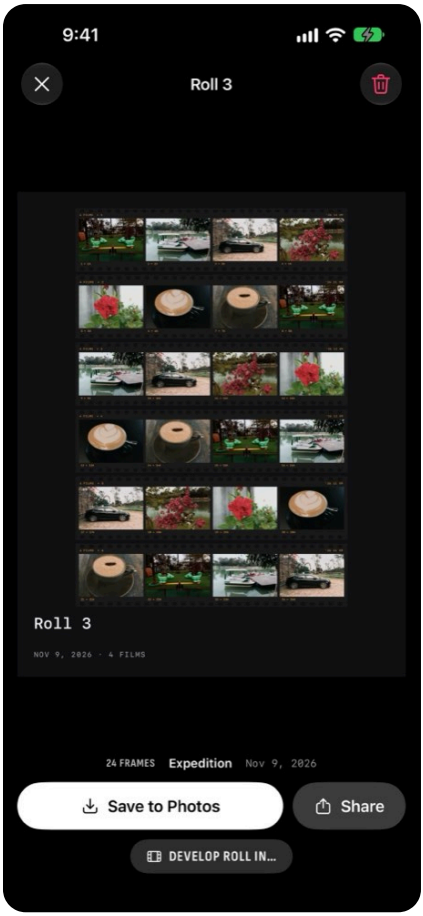
Saving or sharing the sheet is free. If a frame is in a Pro film or has masks or heals, it needs Pro, and a lock shows on the buttons.

Develop Roll In… puts every frame in one other film. Chobial asks, for example, "Develop all 24 frames in Mono?" Each frame keeps its RAW and its edits. **Undo** puts each frame back in its old film, until you leave the contact sheet. So you can shoot the day in one film and still try the whole roll in another.

In Chobial

1. Open **Controls** and tap **Rolls** until it says **24**.
2. Load one film. Swipe across the viewfinder.
3. Shoot. Tap the count in the left ear to see how many frames are left.
4. When the photo button says **ROLL DONE**, tap it. The contact sheet opens.

5. Tap **Develop Roll In…** to try the roll in another film. **Undo** puts it back.
6. Tap **Save to Photos** or **Share** to keep the contact sheet itself.



SCREENSHOT the contact sheet of a 24-frame roll, with Save to Photos, Share and Develop Roll In… under it

> **On Android:** Chobial for Android is in a closed beta. Rolls, the contact sheet and **Develop Roll In…** work the same, and the contact sheet's button says **Save to Gallery**. Holding a volume key for about half a second locks focus and exposure (chapter 19). The ultra-wide may show as **.6**, and there's no 2× sensor crop. RAW is saved as DNG. There's no iCloud, so your backup is your own second copy (chapter 32).

See it

Make the same roll's contact sheet twice. First, look at the sheet in the film you shot it in, for example **Standard**. Then tap **Develop Roll In…** and pick **Mono**. It's the same 24 frames in the same order, one tap apart.

Common mistake

You take three or four photos of the first nice thing, or hold the shutter for a burst. The count reaches 24 in twenty minutes, before the best light or the best subject.

To spot it, look for rows of near-duplicates of one thing on the contact sheet.

To fix it, take one or two frames per idea, and check the count in the ear. Save frames for later in the day. If you fill the roll early anyway, that's fine. The next photo starts a new roll, and the contact sheet shows you what happened.

Try it

Shoot 24 frames in one film on one day, with one idea from each part of the book.

Pick a film for the day's light and keep it for all 24 frames (chapter 24). **Standard** works when you're not sure. Try **Clear** for bright sun, **Chrome** for overcast days, or **Mono** for black and white (chapter 25). All three are free.

- **Frames 1–3, placing things (chapter 3):** a horizon on a third of the frame, with **Grid** and **Level** on.
- **Frames 4–6, a leading line (chapter 4):** a road, path or fence that runs from the bottom edge to your subject. Stay off train tracks and out of traffic.
- **Frames 7–9, light (chapter 7):** one subject in side light, front light and backlight.
- **Frames 10–12, shutter speed (chapter 9):** two moving things frozen at **1/250** or faster, and one with motion blur on purpose.
- **Frames 13–14, highlights (chapter 13):** a bright sky with **Zebras** on. Lower EV until the stripes leave the sky.
- **Frames 15–17, your phone's cameras (chapter 17):** one subject at **.5**, **1** and **2**. Step back each time so the framing matches.
- **Frames 18–19, tap and lock (chapter 19):** hold on a bright part until **AE/AF LOCK** shows, then recompose.
- **Frames 20–22, a portrait (chapters 34 and 35):** ask first. A friend by a window, at their eye level, at **2**.
- **Frames 23–24, straight lines (chapter 44):** a doorway with its sides parallel to the grid's upright lines.

After the roll:

1. Tap **ROLL DONE**, and note the frame numbers you like.
2. If you want, try **Develop Roll In…** with one other film. Then **Undo**, or keep it.
3. Pick 6 photos in story order (chapter 30).
4. Share 1 (chapter 31), or print all 6 (chapter 33).
5. Make your backup the same evening (chapter 32).
6. Tap **Back to Auto** in **Controls** to give back everything you set.

In chapter 0, you took ten photos on Auto. Put the contact sheet next to those ten, and see what changed. And in the Films list, your film's row now says **FIRST ROLL**.

Where to go next

The book ends with reference pages. They have "My photo is ___" fixes for photos that are too dark, blurry or orange. There are also cheat sheets, a 30-day challenge and a glossary.

In the app, **Settings › Tutorial** has short lessons on each part of Chobial, including "Shooting in rolls". On chobial.app, the **Journal** has articles on film looks, RAW and phone photography. The **Help** pages show the camera and the editor step by step.

Your next photo starts the next roll by itself.

Reference pages

These pages are for looking things up while you shoot or edit. Each line gives the chapter where you can read more. You don't need to read them in order.

My photo is...

Find the problem, try the fix, and read the chapter if you want the full story.

Too dark

Likely cause

- A bright background or sky made the meter darken everything. The subject came out dark, close to a silhouette (chapter 8).
- Snow, fog or a white wall. The meter pulls bright scenes toward middle gray, so they come out gray and dark (chapters 8, 43).
- EV was dragged down by accident and stayed set. It shows in orange in the exposure line (chapter 0).
- You set the shutter yourself and the ISO turned red. The camera can't reach the brightness, so the photo comes out too dark (chapters 9, 12).
- A lock (**AE/AF LOCK**) from a bright sky is still on. The orange label is in the top left corner (chapter 19).

Fix in Chobial

- Tap the subject, so the meter measures it. Then drag up on the picture to raise EV. A sun shows beside the spot (chapter 8).
- For snow, add about +1 EV, or up to +2 in bright sun. For fog, add +0.3 to +1 EV. Check with **Zebras** (chapter 43).
- If EV is orange and you didn't mean it, tap **EV** in the exposure line, then **Reset**. Or tap the picture (chapter 0).

- If ISO is red, move to more light, pick a slower shutter, or tap **Auto** on the shutter dial (chapters 9, 12).
- Tap the picture to let go of a lock (chapter 19).
- Already taken? Open the photo, tap **Edit**, then **Light**, and raise **Exposure** or **Shadows**. A RAW has the most room (chapters 22, 26).

Too bright

Likely cause

- A dark subject or a dark background. The meter brightens it toward middle gray, so a black cat or a dark cup comes out gray and too bright (chapters 8, 40, 42).
- EV was dragged up and stayed set (chapter 0).
- You set ISO and shutter yourself, then walked from shade into sun. The camera changes nothing, so the photo comes out far too bright (chapter 37).
- A long shutter in bright sun. The ISO can't go low enough and turns red (chapter 9).

Fix in Chobial

- Drag down on the picture to lower EV. A black cat needs about –1 EV (chapter 42).
- Turn on **Zebras** (**Controls › Guides › Zebras**) and lower EV until the stripes go (chapter 13).
- Tap **Back to Auto** in **Controls** to give everything back to the camera (chapter 12).
- In the editor, lower **Exposure** or **Highlights** (chapter 26). A part that went pure white can't come back (chapter 13).

Blurry

There are three kinds of blur, and each has its own fix. The editor can't fix any of them (chapter 37).

Likely cause: camera shake. Everything is soft, even still things (chapter 9).

- Hold the phone with two hands and your elbows in. Squeeze a volume button gently. It shoots when you let go.
- Or rest the phone and set **Timer** to 3s in **Controls**.
- Hand-held, keep the shutter at about 1/30 s or faster. In dim light, raise the ISO instead of letting the shutter get slower (chapters 9, 12, 18).
- Wipe the lens. A dirty lens makes photos hazy all over, and makes lights glow and streak at night (chapter 18).

Likely cause: motion blur. Still things are sharp, but the moving thing is smeared (chapter 9).

- Set the shutter yourself. Tap the shutter value in the exposure line and slide the dial.
- Use about 1/250 s for people walking. Use 1/500 to 1/1000 s for running children, dogs, sports and cyclists (chapter 9).
- While Chobial follows a subject, it keeps the shutter at 1/125 s or faster. That's too slow for running (chapter 42).

Likely cause: missed focus. Something else is sharp (chapter 14).

- Tap the subject before you shoot. Or tap inside the white corners around a person, so they turn green and the camera follows them.
- A tap on a person aims at the middle of the face. To focus on the eye itself, touch and hold on the eye for **AE/AF LOCK** (chapters 14, 19, 35).
- If **MF** shows in the exposure line, focus is still set by hand. Tap **Auto** on the **Focus** dial, or tap the picture (chapter 14).
- Too close to a small object? Step back a little (chapter 14).
- Zoom in on the eyes right after the shot to check (chapter 14).

Flat

Likely cause

- Front light or noon top light, so there are no shadows to show shape (chapter 7).
- Haze over a long view (chapter 38).
- A dirty lens (chapter 18).
- The "HDR look", from pushing **Shadows** all the way up and **Highlights** all the way down (chapter 26).
- A film with low contrast. **Cinema** has the lowest contrast of the built-in films (chapter 41).

Fix in Chobial

- Turn so the light comes from the side, move into open shade, or come back at golden hour (chapter 7).
- In the editor, try **Light › Contrast**. Use **Film › Dehaze** for haze, and add a little **Film › Clarity** (chapter 26).
- Pull back **Shadows** and **Highlights** if you pushed them (chapter 26).
- Try a film with firmer shadows, like **Chrome** (free) (chapter 24).
- Wipe the lens (chapter 18).

Orange

Likely cause

- Warm bulbs (about 2700–3000 K) with auto white balance or a daylight setting (chapter 15).
- Golden hour or candlelight, which should look warm (chapter 15).
- A warm film (chapter 24).

Fix in Chobial

- In the camera, open **Controls › WB** and tap **Tungsten** (3200 K). Or tap **Kelvin** and lower the number (chapter 15).
- The number is the light's color. If the photo is too orange, lower the number (chapter 15).

- In a café, about 3500–4000 K removes some orange and keeps a little warmth (chapter 40).
- Or tap **Gray Card**, then tap something white or gray in the same light (chapter 15).
- Afterwards, move **Edit › Color › Temperature** toward minus (chapter 26).
- Keep some warmth at sunset and by candlelight (chapter 15).

Blue

Likely cause

- Open shade on a sunny day, blue hour, or snow in shade or under a blue sky (chapters 15, 43).
- **Tungsten** white balance is still set from last night. White balance stays set, even after you close the app. Its value shows in orange in the exposure line (chapter 15).
- The **Tungsten** film adds a cool, blue lean (chapter 24).

Fix in Chobial

- Tap **Controls › WB › Shade** (7500 K) or **Cloudy** (6500 K) (chapters 15, 43).
- If the WB value in the exposure line is orange and you don't need it, tap it, then **Auto**. Or tap **Back to Auto** in **Controls** (chapter 15).
- With **Kelvin**, raise the number if the photo is too blue (chapter 15).
- Afterwards, move **Edit › Color › Temperature** toward plus (chapter 26).
- Blue hour should stay blue (chapter 15).

Sky gone white

Likely cause

- The sky is much brighter than the land, and one exposure can't keep both. The sky clips to pure white (chapters 13, 38).

- You tapped a dark subject, and the sky went white. That's sometimes the right trade, because the face matters more (chapter 8).

Fix in Chobial

- Turn on **Zebras** and **Histogram** (**Controls › Guides**). Stripes on the sky, or a histogram piled at its right edge, mean the sky is clipping.
- Drag down to lower EV until the stripes leave the sky (chapters 13, 38).
- Or touch and hold on a bright part of the sky for **AE/AF LOCK**, then frame (chapters 19, 38).
- Then brighten the dark parts later in **Edit › Light › Shadows**. RAW by default helps here (chapter 26).
- Already white? Lower **Highlights**. If clouds come back, the detail was there. If the sky turns flat gray, it's gone (chapter 13).
- A **Sky** or **Linear** mask can darken only the sky. Saving masks needs Pro (chapter 27).
- On a plain white sky, frame it out or put the horizon high (chapter 38).

Noisy

Likely cause

- Dim light and a high ISO (chapter 10).
- Plain RAW at night. It's one frame, with nothing merged (chapter 20).
- Pushing EV up at night, or brightening a dark photo a lot. That brings up the noise too (chapters 10, 21).

Fix in Chobial

- Find more light: a window, outside, or a lamp (chapter 12).
- If nothing moves, rest the phone. Set **Timer** to 3s, the lowest ISO and a long shutter (chapter 21, "Way 2").
- With only the ISO set, the camera won't go slower than 1/8 s. Set the shutter too for longer times (chapter 12).

- For a night photo that must look clean, use **ProRAW** on a Pro iPhone, or **HEIF**. Tap the format label beside the Dynamic Island (chapters 20, 22).
- Let night be dark (chapter 21).
- If people or cars move, keep the ISO high anyway. A sharp, grainy photo beats a clean, blurry one (chapter 10).
- A grainy film like **Press** or **Night** hides noise in the grain (chapters 37, 41).

On Android: there's no ProRAW. RAW is one frame, saved as DNG (chapter 20).

Crooked

Likely cause

- The phone was tilted a little, so the horizon or a building leans (chapter 3).
- You tilted the phone up, so buildings lean in at the top. These are converging verticals (chapter 44).

Fix in Chobial

- Turn on **Level** (**Controls › Guides › Level**). Wait for the line to turn orange, with a click on iPhone (chapter 3).
- Already taken? Open **Edit › Crop**. Slide the straighten dial (–15° to +15°), or tap **Auto** (the level icon). Then tap the orange checkmark at the top right (chapters 3, 26).
- Straightening cuts a little off the edges (chapter 26).
- For leaning buildings, keep the phone upright. Then step back, climb higher, or use **.5** and crop the bottom (chapter 44).
- The straighten dial can't fix converging verticals, because it only turns the whole photo (chapter 44).

On Android: the level is one straight line, with no degree number and no click. It still turns orange. **Auto** in Crop uses straight edges only, never a horizon (chapter 44).

Colors look fake or overedited

Likely cause

- Too much **Saturation**. Colors get loud, skin turns orange or red, and strong colors turn into flat patches (chapter 26).
- Too much **Clarity** or **Sharpen**. You get halos along edges and rough faces (chapter 26).
- The flat HDR look (chapter 26).
- A film at full strength. It can be a lot on some photos (chapters 24, 26).

Fix in Chobial

- Hold **Compare** to see the original. Look away for a minute, then look again. View it small and at full size (chapter 26).
- Pull each slider back to about half. Tap a setting in the row to turn it off and compare (chapter 26).
- Use **Vibrance** instead of **Saturation** for a little more color (chapter 26).
- Try the film's **Strength** at about 70% (chapter 26).
- Hold **Undo** and pick an earlier step, or use the tool's red ↺ reset (chapter 26).
- My rule of thumb: stop when the photo looks the way the scene felt to you (chapter 26).

Cheat sheets

Shutter speed by subject

From chapters 9, 12 and 37–43.

Subject	Shutter	Chapter
Hand-held, nothing moving (the slowest most people can hold)	about 1/30 s	9
People walking (street, travel, a barista pouring)	about 1/250 s	9, 37, 40
Running children, dogs, sports, cyclists	1/500 to 1/1000 s	9, 42
Jumping or fast running	1/1000 s	42
Water drops and splashes in the air	1/1000 s or faster	9
Falling snow, frozen	1/250 s or faster	43
Falling rain as dots	about 1/500 s or faster	43
Falling rain as short streaks	about 1/60 s	43
Cars at night, sharp, lights as dots	about 1/125 s	41
Panning a passing car or bike	start around 1/30 s, take a burst	9
Food on a table, elbows resting	about 1/30 s	40
Silky water (phone resting)	about 1/4 s and slower	9
Light trails (phone resting)	1/4 s or longer	41

- While Chobial follows a person or pet and sets the exposure itself, it keeps the shutter at 1/125 s or faster (chapter 9). In a very dark room it can give up this limit.
- To set the shutter, tap its value in the exposure line and slide the dial. The steps are a third of a stop. Tap **Auto** on the dial to give it back (chapter 9).
- The value stays set until you tap **Auto** or **Back to Auto** (chapter 9).
- If the ISO turns red, the photo will come out too dark (chapter 9).

- **On Android:** following tracks faces only, so the 1/125 s rule works for people but not pets. The **Shutter** and **ISO** tiles show only on lenses that let apps set them (chapter 9).

White balance by light

From chapter 15.

Light	About	Chobial setting
Candle flame	1900 K	**Kelvin** (the dial goes down to 2500 K)
Old-style bulbs, "warm white" LEDs	2700–3000 K	**Tungsten** (3200 K) or **Kelvin**
Low sun at sunrise or sunset	3000 K or lower	Keep the warmth, or **Kelvin**
Tube lights	—	**Fluorescent** (4000 K, with a small tint change)
Midday sun	5000–5500 K	**Daylight** (5500 K)
Cloudy sky	6500 K	**Cloudy** (6500 K)
Open shade	7500 K or more	**Shade** (7500 K)
Clear blue sky alone	10000 K or more	**Kelvin** (up to 10000 K)
A café under warm bulbs	—	**Kelvin** about 3500–4000 K (chapter 40)
Mixed light	—	**Auto**, or make the light on your subject neutral

- Open it with **Controls › WB**. The buttons are **Auto**, **Daylight**, **Cloudy**, **Shade**, **Tungsten**, **Fluorescent**, **Kelvin** and **Gray Card**.

- **Kelvin** goes from 2500 K to 10000 K in steps of 100 K. It starts at 5600 K the first time.
- **Gray Card**: tap it, then tap something white or gray in the same light. The camera switches to **Kelvin** at the number it measured, and sets the tint too.
- The number is the light's color. Photo too orange? Lower it. Too blue? Raise it.
- White balance stays set, even after you close the app. Tap **Auto**, or **Back to Auto** in **Controls**.
- Later, in the editor, use **Color › Temperature** (−3000 to +3000 K, plus is warmer) and **Tint** (−50 to +50) (chapter 26).
- The **Tungsten** film and the **Tungsten** white balance button are two different things.
- **On Android:** you get the same buttons, the same Kelvin dial and **Gray Card**. **WB** may be missing on some lenses (chapters 15, 43).

The exposure triangle on one page

From chapters 8–12.

Setting	More light by…	What it costs	Chapter
Shutter speed	a longer time	motion blur and camera shake	9
ISO	a higher number	more noise	10
Aperture	a bigger opening (smaller f-number)	shallower depth of field; fixed on phones	11

- One stop is twice the light, or half (chapter 8). ISO 100, 200 and 400 are one stop apart (chapter 10). Chobial's dials move in thirds of a stop (chapters 9, 10).

- These all give the same brightness: 1/60 s at ISO 400, 1/125 s at ISO 800, 1/250 s at ISO 1600 (chapter 12).
- A phone's aperture is fixed. It's *ƒ*1.6 on the iPhone Duo and *ƒ*1.78 on the 17 Pro Max. So on a phone, the triangle is a line: shutter and ISO (chapter 12).
- Depth of field on a phone comes from distance and lens choice (chapter 11).
- The light itself is a fourth way. Move to a window, go outside, or add a lamp or a flash (chapter 12).

Pick the one that matters (chapter 12):

- Something moving: set the shutter, and the ISO follows.
- Phone resting, nothing moving, dim: set the lowest ISO.
- Blur on purpose: set a long shutter (1/4 s or longer).
- Hand-held in dim light: raise the ISO before the shutter gets slower than about 1/30 s.
- Only the brightness is wrong: use EV.
- Not sure: leave it to the camera.

The four combinations in Chobial (chapter 12):

You set	What happens
Nothing	The camera sets ISO and shutter. Dragging on the picture changes EV.
ISO only	The camera sets the shutter, never slower than 1/8 s. EV changes the shutter.
Shutter only	The camera sets the ISO. EV changes the ISO.
Both	The camera changes nothing. EV turns gray and shows how far you are from the meter.

- With both set, you can't change EV, and nothing turns red. So watch that EV reading. The 1/8 s limit is gone too.
- Orange values are yours, gray values are the camera's, and red means the camera can't reach the brightness (chapters 0, 12).

Film picker by light

From chapter 24.

Every film's card in the app has a **Suits** line naming the light it's made for (**Films** › ⓘ). I built this table from those lines. Free films save for free. Pro films need Pro to save, but you can try every film in the viewfinder and the editor (chapter 24). When I'm not sure, I start with **Standard** ("Any light, every day").

Light	Free films	Pro films
Bright sun, clear skies	Clear, Holiday, Daylight	Negative, Expedition, Heritage, Saturated, Gold
Low sun, golden hour, sunrise, sunset	Landscape	Nostalgia, Gold
Overcast days	Cool, Chrome, Projection	Everyday
Soft light, open shade, windows, faces	Soft, Portrait, Wedding	Pastel, Soft Portrait
Warm lamps indoors	Eighties	Vintage
Dusk, night, street lights	Night	Cinema, Tungsten, Dusk, Noir
Hard light and texture	Bleach, Chrome	B&W
Any light	Standard, Portrait, Wedding	—

Black and white by sky and subject (from the cards and chapters 25, 37, 38, 44):

Black and white for…	Free	Pro
Clean light, simple scenes	Mono	—
Landscapes with sky (yellow filter, darkens a blue sky a little)	Mono + Ye	B&W + Ye
Dramatic skies and architecture (red filter, dark blue skies)	Mono + R	B&W + R
Foliage and outdoor portraits (green filter)	Mono + G	B&W + G
Street and reportage, gritty grain	Press	—
Old buildings and quiet scenes	Sepia	—
Night, rain and drama	—	Noir

- A red or yellow filter darkens only a blue sky. A white or gray sky stays pale (chapter 25).
- For the films that aren't in the tables, the cards say:
- **Natural** (Pro): "Everyday light, skin and greenery".
- **Vivid** (Pro): "Landscapes and bold color".
- **Lifelike** (Pro): "Everyday light, true color".
- **Postcard** (Pro, under **Slide**): "Bright color and travel".
- **Aerial** (free): "Cityscapes, haze and views from above".
- **Snapshot** (free): "Street and everyday".
- **Instant** (Pro): "Parties and people up close".
- **Peel Apart** (Pro): "Portraits and still life".
- The 22 free films in color are Standard, Soft, Chrome, Portrait, Wedding, Holiday, Eighties, Aerial, Snapshot, Cool, Night, Daylight, Projection, Landscape, Clear and Bleach. In black and white, they're Mono, Mono + Ye, Mono + R, Mono + G, Sepia and Press (chapter 24).

- No Film is free too, but it isn't one of the 46.
- You can change the film after you shoot, in **Edit › Film**. For a whole roll, use **Develop Roll In…** on its contact sheet (chapter 24).
- Fujifilm users: Provia is close to **Standard**, Astia to **Soft**, Velvia to **Saturated** or **Landscape**, and Classic Chrome to **Chrome** (chapter 24).

Starting settings

Here's a place to start for each kind of photo in Part 4. Then look at the screen and adjust.

Situation	Start with
Portraits (chapter 35)	Window at their side, about 1 m away; your camera at their eye level; **2**; **Portrait** (free); tap inside the corners on the face; EV about +0.3 to +0.7 for light skin, −0.3 to −0.7 for dark skin; **Zebras** on; flash off. Close up, hold on the near eye for **AE/AF LOCK**.
Selfies (chapter 36)	Back camera at **2**; phone resting about 1 m away; face a window; **Timer** 10s or the Apple Watch.
Groups (chapter 36)	**1**; phone at their eye level; hold on a face in the middle for **AE/AF LOCK**; **Timer** 10s; several frames or a short burst; **Portrait** or **Eighties** (both free).
Street (chapter 37)	**Press** (free); **1**; shutter **1/250** (1/500–1/1000 for running children and cyclists); hold on the spot for **AF LOCK**; flash **Off**; panel away; a 24-frame roll.
Landscape (chapter 38)	**Landscape** (free); **Zebras**, **Histogram** and **Level** on; **.5** low and close to something in front, or **1** for the view; hold for **AE/AF LOCK**, then drag down until the stripes leave the sky; ISO and shutter on Auto in daylight; golden hour.
Travel and the city (chapter 39)	**Holiday** (free); **1**; shutter **1/250** for people walking; a 24-frame roll a day; **Frame** 65:24 for wide strips; lower EV when a bright sky sits over a dark street.

Situation	Start with
Food and cafés (chapter 40)	Window beside you or behind the cup; **1** (or **2** from a step back); **Negative** (Pro) or **Chrome** (free); **Frame** 1:1; under warm bulbs, **WB › Kelvin** about 3500–4000 K; hold on the food for **AE/AF LOCK**; keep zebras off the foam; elbows resting, about 1/30 s.
Night and city lights (chapter 41)	**Night** (free); **1**; **Zebras** and **Histogram** on. Hand-held: ISO 1600 or 3200. Resting: **Timer** 3s, the lowest ISO and a long shutter (1/4 s or longer for light trails). Hold on a bright edge to lock focus, then drag down until the stripes leave the lights. Tap **Back to Auto** when you're done.
Pets and children (chapter 42)	**Snapshot** (free); **1** (or **2** from a step back); get down to their eye level; shutter **1/500** (1/1000 for jumping); tap inside the corners to follow; a burst just before they move; about –1 EV for black fur; **Back to Auto** after.
Weather (chapter 43)	Rain: **Projection** (free), 1/60 s for streaks or 1/500 s for dots. Fog: **Mono** (free), +0.3 to +1 EV. Snow: **Mono** or **Standard** (free), about +1 EV (up to +2 in bright sun). Use 1/250 s or faster for falling flakes, and **WB › Cloudy** or **Shade** if it goes blue. Gray day in color: **Cool** (free). Hard sun: **Chrome** (free), drag down until the stripes go. Reset EV afterwards.
Architecture (chapter 44)	**Grid** and **Level** on; **1** (or **.5** when you can't step back); phone upright, no tilt; **Mono + R** (free) under a blue sky, **Chrome** (free) on a gray day; **Zebras** on for a bright sky; crop the extra ground later in **Edit › Crop**.

Whatever you set stays set until you tap **Auto** on its dial or **Back to Auto** in **Controls** (chapter 12).

On Android: there's no 2× sensor crop, so use 1× and crop, or use the telephoto. The lens pill shows the phone's own lenses, like .6, 1, 3 and 5 (chapter 35).

30-day challenge

Here's one exercise a day, taken from the chapters' "Try it" sections. Each one takes 10 to 30 minutes, unless it says otherwise, and the chapter has the full steps. It's fine to skip a day.

Day	Exercise	Chapter
1	Ten photos on Auto, in bright and dark places, some with sky. Keep them all.	0
2	Five scenes from bright to dark. Write down the shutter and ISO for each.	1
3	One subject, five photos, one step closer each time.	2
4	One horizon three ways: on the top line, in the middle, on the bottom line. Turn on **Grid** and **Level**.	3
5	A road, path or fence that leads to a subject. Three photos, the last one low at **.5**. Stay off train tracks and out of traffic.	4
6	One small subject with space around it, in **1:1** and in **65:24**. Set **Frame** back to **4:3** after.	5
7	One subject from ten different places: high, low, close, far, left, right.	6
8	An object by a window in front light, side light and backlight. Then side light with white paper on the shadow side.	7
9	A white wall and a dark wall at ±0, +1 and −1 EV. Reset EV after.	8
10	Running water at 1/1000, 1/60 and 1/4 s, phone resting, **Timer** 3s. Tap **Auto** after.	9
11	A dim room at the lowest and the highest ISO. Zoom into the shadows.	10
12	A small subject at a hand's length, first against a wall, then with lots of room behind.	11

Day	Exercise	Chapter
13	A moving scene three ways: shutter set, ISO set, then both set until EV reads ±0. **Back to Auto** after.	12
14	Open your day-1 photos with ••• › **Show Histogram** and find the lost skies. Then shoot a sky with **Zebras** on, and lower EV until the stripes go.	13
15	A small object 20–30 cm away. Tap it, tap the background, then focus by hand with **Controls › Focus**. Tap **Auto** after.	14
16	One lamp-lit scene at 3000 K, 5500 K and 8000 K with **WB › Kelvin**. Tap **Auto** after.	15
17	One dinner-table scene with flash **On**, flash **Off**, and a friend's phone screen as a light. Check the flash is **Off** after.	16
18	A friend at **.5**, **1** and **2**, stepping back so the framing matches. Compare the nose and ears.	17
19	One still scene at 1/8 s, held five ways, to find your sharpest grip. **Timer** Off and **Auto** after.	18
20	A street under a bright sky. Hold on the sky for **AE/AF LOCK**, then frame the street. Tap the picture to let go.	19
21	One scene in every format your phone has. Compare the file sizes in ⓘ.	22
22	At dusk, a lamp or lit sign in four or five films. Then the same photo in two films.	23
23	A blue sky with clouds in **Mono**. Then try **Mono + R**, **Mono + Ye** and **Mono + G** in the editor.	25
24	Three RAW photos of one place. Edit one in order (film, light, color, strength and texture, crop) in five minutes. Then copy and paste the edits.	26

Day	Exercise	Chapter
25	A friend in front of a bright window: a **Face 1** mask, a **Sky** mask and one **Heal**.	27
26	Your own film from four **Describe Edits** requests, saved with **Save as Film**.	28
27	A window portrait at **2** in **Portrait**: ten frames while you talk.	35
28	One street corner for about an hour, in **Press** at 1/250 s with **AF LOCK** on the spot. Wait for people to walk in.	37
29	A walk from sunset into night in **Night**: blue hour, a lit shop front hand-held, light trails resting. **Back to Auto** after.	41
30	Your first roll: 24 frames in one film, one idea from each part of the book. This one takes a day.	45

After day 30, put the contact sheet next to your day-1 photos and see what changed (chapter 45).

Glossary

0–9

- **3-2-1 rule** (chapter 32): 3 copies of each photo, on 2 kinds of storage, with 1 copy away from home.

A

- **accent color** (chapter 6): One small patch of strong color in a calm, plain or gray scene.
- **AE / AF** (chapter 19): Short for auto exposure (the camera choosing the exposure) and autofocus.
- **AE/AF lock** (chapter 19): Keeping the focus and exposure the camera has now, even when you move the phone. In Chobial, touch and hold the

picture (AE/AF LOCK).

- **AF LOCK (in Chobial)** (chapter 19): The label when a hold locks only focus, because you set ISO or the shutter yourself.
- **anti-halation layer** (chapter 23): A layer film makers add to take in light before it bounces back. It's removed in processing.
- **aperture** (chapter 0): The size of the opening the light comes through. It's fixed on phones.
- **Apple Intelligence / Gemini Nano** (chapter 28): The AI models built into some iPhones and iPads (Apple) and some Android phones (Google), run on the device. Describe Edits needs one.
- **ASA** (chapter 10): The old name for a film's ISO speed.
- **auto white balance** (chapter 15): The camera guessing the light's color by itself. One big color or mixed light can fool it.
- **autofocus** (chapter 14): The camera moving the lens by itself to make a spot sharp.

B

- **background** (chapter 4): The part of the scene farthest from the camera.
- **backlight** (chapter 7): Light from behind the subject, facing the camera. It gives bright outlines and can make a silhouette.
- **backup** (chapter 32): A second copy of a file kept somewhere else, so you can get it back if the first is lost.
- **balance** (chapter 5): The visual weight on both sides of the frame feels even, so the picture doesn't tip.
- **Bayer mosaic / demosaicing** (chapter 22): The pattern of red, green and blue filters over a sensor's pixels. Each pixel records one color. Demosaicing is the step that works out every pixel's full color.
- **bit depth (steps per color)** (chapter 22): How many brightness steps a file stores for each color: JPEG 256 (8 bits), ProRAW 4,096 (12 bits). More steps means less banding when you edit.

- **bloom** (chapter 23): A white glow from the lens or a diffusion filter, with light of every color spreading.
- **blue hour** (chapter 7): The short time before sunrise and after sunset, when the sky is deep blue.
- **burst** (chapter 0): A fast run of photos taken while you hold the shutter.

C

- **Camera Control** (chapter 18): The button on the lower right side of iPhone 16 and later models that have it. Click to shoot, or light-press for Film, Exposure, ISO and Shutter.
- **camera obscura** (chapter 1): A dark room with a small hole. Light through the hole makes an upside-down picture on the far wall.
- **camera RAW formats (RAF, ARW, NEF, CR3)** (chapter 29): Each maker's own RAW file type: Fujifilm RAF, Sony ARW, Nikon NEF, Canon CR3 (older CR2). Some cameras save DNG.
- **camera shake** (chapter 9): Blur over the whole photo, because your hands moved the phone while the shutter was open.
- **card reader** (chapter 29): A small device that holds the camera's memory card and plugs into the phone.
- **catchlight** (chapter 35): The small bright reflection of a light, like a window, in a person's eyes.
- **chip (Describe Edits)** (chapter 28): A small label under a request for one change: the slider, where it is now and how far it moved. × takes it back.
- **clarity** (chapter 26): Contrast in mid-sized detail, mostly in the midtones (Film › Clarity, −100 to +100).
- **clipped (blown out)** (chapter 13): So bright that the sensor recorded pure white, with no detail left. It can't be brought back.
- **cloud service** (chapter 32): Storage on a company's computers that you reach over the internet.

- **color cast** (chapter 15): A color, like orange or blue, that tints the whole photo but isn't in the things themselves.
- **color channels** (chapter 13): The red, green and blue parts of a histogram, each color on its own. One can clip while the overall graph looks fine.
- **color filter (on the lens)** (chapter 25): Colored glass on the lens for black and white. It lightens its own color and darkens the opposite colors.
- **color grading** (chapter 27): Tinting the shadows with one color and the highlights with another (Color › Grading).
- **color negative film (print film)** (chapter 24): Film where the colors come out reversed on an orange-tinted negative, then get printed on paper. It's what most people shot for snapshots.
- **color noise** (chapter 10): Noise as tiny specks of the wrong color, like red, green and blue dots.
- **color temperature** (chapter 15): The color of a light, given as a number in kelvin.
- **color wheel** (chapter 6): The ring of colors painters use.
- **complementary colors** (chapter 6): Colors opposite each other on the color wheel: red and green, blue and orange, yellow and purple.
- **composition** (chapter 3): Where you put things in the frame and what you leave out.
- **compression / lossy compression** (chapter 22): Making a file smaller. Lossy compression throws away fine detail and color steps the eye hardly notices, for good.
- **condensation** (chapter 43): Tiny water drops that form on something cold when it meets warm, damp air. On a phone lens it looks like fog.
- **contact sheet** (chapter 24): One page with every frame of a roll on it in rows, as labs printed from a developed roll.

- **contrast** (chapter 7): The difference between the bright and dark parts of a picture.
- **converging verticals** (chapter 44): Upright lines that lean toward each other in a photo, because the phone was tilted up or down.
- **Copy Edits / Paste Edits** (chapter 26): ••• › Copy Edits… picks parts of a photo's edits (Film, Light, Color, masks, Heal, Crop). ••• › Paste Edits puts them on another photo, or on many from Select.
- **creative LUT / log LUT** (chapter 28): A creative LUT is made for a finished picture and works on photos. A log LUT is made for flat, gray log video, and looks heavy and crushed on photos.
- **crop** (chapter 2): Cutting the edges off a photo. In Chobial you can change it or take it off later.
- **crushed shadows** (chapter 13): Shadows clipped to pure black.
- **culling** (chapter 30): Going through a shoot and taking out the weak photos.

D

- **daguerreotype** (chapter 36): An early kind of photo made right on a polished, silver-coated metal plate, with no negative. Each one is the only copy, and most are mirror images.
- **daylight film / tungsten film** (chapter 24): Color film made for one color of light: sunlight, about 5500 K (D) / tungsten lamps, about 3200 K (T).
- **decisive moment** (chapter 6): Cartier-Bresson's phrase for the split second when the action and the places of things in the frame come together.
- **Deep Fusion** (chapter 20): Apple's pixel-by-pixel merging of several frames in medium and low light, for texture and less noise (since iPhone 11, 2019).
- **depth of field** (chapter 11): The part of the scene, from near to far, that still looks sharp.

- **Describe Edits** (chapter 28): Typing or saying how a photo should look. Chobial moves its own sliders, worked out on the device. It's free.
- **Develop Roll In…** (chapter 24): On a roll's contact sheet, it develops every frame in one film. Each frame keeps its RAW and edits, and Undo works until you leave.
- **developing (a RAW)** (chapter 22): Turning the sensor's data into a picture: white balance, colors, brightness curve, noise reduction and sharpening.
- **diagonal** (chapter 4): A line that runs at a slant across the frame.
- **digital negative** (chapter 22): A RAW file kept like a film negative and developed again whenever you like.
- **digital zoom** (chapter 17): Enlarging part of the picture by stretching its pixels, which makes it soft. Chobial's camera has none.
- **DNG** (chapter 22): Digital Negative, Adobe's open RAW file format. iPhone RAW, ProRAW and Android RAW are DNG files.
- **Dynamic Island** (chapter 0): The black pill at the top of an iPhone's screen.
- **dynamic range** (chapter 13): The range from the darkest to the brightest part a camera can record in one photo, with detail in both.

E

- **editing (choosing)** (chapter 30): The old meaning of editing: choosing which photos to show, and in what order.
- **emulsion** (chapter 23): The thin light-sensitive layers on film's clear plastic base.
- **establishing shot** (chapter 30): A wide shot that shows the place, so the viewer knows where the story is.
- **EV** (chapter 0): How much brighter or darker than the camera's own choice the photo will be.

- **exposing for the highlights** (chapter 13): Setting the exposure so the important bright parts keep their detail, then brightening the dark parts later.
- **exposure** (chapter 1): The amount of light the sensor collects for one photo.
- **exposure compensation** (chapter 8): Telling the camera to make the photo brighter or darker than the meter chose. It shows as EV.
- **exposure latitude (latitude)** (chapter 24): How far from the right exposure a film can be and still give a good picture. It's narrow on slide film and wide on color negative.
- **exposure triangle** (chapter 12): Shutter speed, ISO and aperture, the three settings that together decide the exposure. Change one, and another must change the other way to keep the same brightness.
- **eye level** (chapter 6): The camera at the height of your eyes, standing. It looks normal.

F

- **fade** (chapter 23): Slightly lifted blacks, as in prints and scans of film.
- **fast / slow film** (chapter 24): Fast film has a high ISO (800, 1600) for dim light and bigger grain. Slow film (ISO 50, 100) is for bright light and fine detail.
- **fast / slow shutter** (chapter 9): Fast is a short shutter time, slow is a long one.
- **feather** (chapter 27): How soft the edge of a heal is.
- **field of view** (chapter 17): How much of the scene a lens takes in, from side to side.
- **figure and ground** (chapter 6): The subject (figure) and what's behind it (ground). The figure has to stand apart.
- **file format** (chapter 22): The way a photo's data is stored in a file.

- **fill light (fill flash)** (chapter 16): Extra light that brightens the shadows without being the main light, like flash on a backlit face.
- **film (in Chobial)** (chapter 0): A color look modeled on a real film stock.
- **film (real film)** (chapter 1): Plastic coated with chemicals that change when light hits them. It did the sensor's job before sensors.
- **film code** (chapter 28): A film's QR code on the back of its card (Films › ••• › Share Film). Scanning it adds the film.
- **film emulation (film simulation)** (chapter 23): A copy of how a real film behaves: tones, highlight roll-off, color shifts, grain and halation. It works best on RAW.
- **film stock** (chapter 23): One kind of film sold under one name, like Kodak Portra 400.
- **filter** (chapter 23): A fixed effect that changes every photo the same way, usually on a finished JPEG or HEIF.
- **flash** (chapter 16): A short, bright burst of light at the moment of the photo. On a phone it's a small LED next to the lenses (Off, Auto, On in Chobial).
- **flash powder** (chapter 16): A powder early photographers set alight for one very bright, very short flash.
- **flat lay** (chapter 40): A straight-down photo of things laid out on a table.
- **f-number** (chapter 11): How big the aperture is, written f/2, f/8 and so on. It's the focal length divided by the opening's width, so a small number is a big opening.
- **focal length** (chapter 11): How strongly a lens magnifies. Phones give it in full-frame terms, like 24mm.
- **focus** (chapter 14): The distance the lens makes sharp.
- **focus peaking** (chapter 14): Colored lines over the edges that are in focus. They're red in Chobial and on by default (Controls › Guides › Peaking).

- **focusing by hand (manual focus)** (chapter 14): You choose the focus distance yourself. Chobial shows MF (Controls › Focus, NEAR to ∞).
- **foreground** (chapter 4): The part of the scene closest to the camera.
- **frame** (chapter 2): The rectangle of the picture, out to its four edges.
- **frame lines** (chapter 2): Chobial's darkened mask that shows a chosen shape (3:2, 1:1, 16:9, 65:24) on the viewfinder. The whole sensor is still saved.
- **frame within a frame** (chapter 4): Something in the scene, like a door, window, arch or branches, that makes a border around the subject.
- **freeze (motion)** (chapter 9): A short enough shutter time makes a moving thing look sharp and still.
- **front light** (chapter 7): Light from behind the photographer onto the front of the subject. It looks flat.
- **Fujifilm recipe** (chapter 29): A written-down list of Fujifilm in-camera settings, starting from a film simulation. You can rebuild one in Chobial as a film.
- **full-frame** (chapter 21): A sensor the size of one frame of 35mm film, 36 × 24 mm. Phone focal lengths are given "in full-frame terms".

G

- **glossy / matte paper** (chapter 33): Glossy is shiny, with the deepest blacks and strongest colors, and shows reflections. Matte has no shine and softer blacks, and is easy to see under any light.
- **golden hour** (chapter 7): The time soon after sunrise and before sunset, with low, warm light from the side.
- **golden ratio** (chapter 5): A number, about 1.618. Its lines sit at about 38% and 62% of the frame, just inside the thirds.
- **GPS position (location)** (chapter 31): The place a photo was taken, as a point on a map, stored in the file's metadata.

- **graduated ND filter** (chapter 27): Glass that's dark at the top and clear at the bottom, to darken a bright sky. A Linear mask does the same after the shot.
- **grain (film grain)** (chapter 10): The speckled texture of real film. Fast film has bigger grain.
- **gray card** (chapter 15): A card printed in an even, neutral gray, used to set white balance. A white wall or paper works too (Chobial's **Gray Card** button).
- **grid (in Chobial)** (chapter 3): Rule-of-thirds lines over the viewfinder, shown on screen only (Controls › Guides › Grid).
- **Group f/64** (chapter 11): A 1932 group of US photographers (Ansel Adams, Edward Weston), named after a very small aperture, for photos sharp from front to back.

H

- **halation** (chapter 23): The red-orange glow around bright lights on film, from light bouncing back off the film base. It's white on black-and-white film.
- **halo** (chapter 26): A bright or dark outline along an edge where dark meets bright, from too much clarity or sharpening.
- **hard light** (chapter 7): Light from a small or far-away source. It gives sharp-edged shadows and strong contrast.
- **haze** (chapter 38): The thin mist you see over long distances. Each farther ridge looks paler.
- **HDR+ / Night Sight** (chapter 20): Google's names for the Pixel's burst merging and its low-light version.
- **HDR look** (chapter 26): A flat, gray picture with everything at the same middle brightness. It comes from Shadows all the way up and Highlights all the way down. HDR means high dynamic range.
- **Heal / Clone** (chapter 27): Heal fills a spot from nearby and blends it into the light and color around it. Clone copies the source exactly.

- **HEIF (.heic)** (chapter 22): High Efficiency Image Format, the iPhone Camera app's default. It's often about half the size of a similar JPEG.
- **highlight roll-off** (chapter 23): Film's slow, soft fade into white in the brightest tones.
- **highlights / shadows / midtones** (chapter 13): The brightest parts of a photo / the darkest parts / everything in between.
- **histogram** (chapter 13): A graph that sorts every pixel by brightness, with black at the left edge and white at the right. Taller means more of the photo at that brightness.
- **horizon** (chapter 3): Where the land or the sea meets the sky.
- **hunting** (chapter 14): Autofocus moving back and forth without settling.

I

- **inverse-square law** (chapter 16): Light falls off fast with distance. Twice as far from the light gets a quarter of the light.
- **ISO** (chapter 0): How much the camera brightens the light it gets.
- **ISO steps** (chapter 10): Each doubling of the ISO number is one stop brighter (100, 200, 400). Chobial's dial moves in thirds.

J

- **JPEG** (chapter 22): The most common photo file, which any phone, computer or website opens. It has 256 steps per color (8 bits).
- **juxtaposition** (chapter 6): Two things side by side in the frame, so the viewer compares them.

K

- **keeper** (chapter 30): A photo good enough to keep and show.
- **kelvin (K)** (chapter 15): The unit for color temperature, like 5500 K. Low numbers are orange light, high numbers are blue light.
- **Kodachrome** (chapter 10): A color film made by Kodak.

L

- **landscape (shape)** (chapter 2): A frame that's wider than it is tall.
- **landscape photography** (chapter 38): Photos of land, sea and sky, like mountains, fields, rivers and coasts.
- **layers** (chapter 4): Foreground, middle ground and background each have something in them, so the photo looks deep.
- **leading lines** (chapter 4): Lines in the scene that carry the eye toward the subject.
- **level (in Chobial)** (chapter 3): A line on the viewfinder that turns orange when the phone is straight (Controls › Guides › Level).
- **light direction** (chapter 7): Where the light comes from, compared with the camera.
- **light trail** (chapter 41): The line a moving light, like a car's headlights, draws in a photo while the shutter is open.
- **Lightroom** (chapter 28): Adobe's photo editor. Its presets (.xmp, .lrtemplate, .dng) import into Chobial as films.
- **Live Film (in Chobial)** (chapter 23): Controls › Guides › Live Film. The viewfinder shows the loaded film (on by default). Off shows NO FILM, and photos still get the film.
- **local edit** (chapter 27): A change to one part of a photo only.
- **local tone mapping** (chapter 20): Brightening dark areas and darkening bright areas, by a different amount in each area of the photo. Chobial's built-in films turn it off on RAW and ProRAW.
- **loupe** (chapter 14): A small magnifier. In Chobial, it's a 4× square in a top corner while you focus by hand.
- **LUT (.cube)** (chapter 28): A big table that maps each color to a new color. Chobial imports 3D .cube LUTs as films.

M

- **main camera (1×)** (chapter 17): The phone's 1× back camera (24mm in full-frame terms on recent iPhones). It usually has the biggest sensor and widest aperture, and it's the best in dim light.
- **mask** (chapter 27): A selection of one part of the photo with its own edits. Chobial finds some (Subject, Sky, Face…) and you draw others (Brush, Linear, Radial, Color, Luminance).
- **mat (export frame)** (chapter 31): A border that pads a photo out to a shape like 4:5 without cropping it.
- **megapixel** (chapter 1): A million pixels.
- **metadata** (chapter 31): Hidden text a photo file carries: date, camera settings, and sometimes a GPS position.
- **meter** (chapter 8): The part of the camera that measures the light and picks the exposure.
- **metering** (chapter 7): How the camera measures the light to choose the exposure. Tap the picture to meter on a spot.
- **middle gray** (chapter 8): An average brightness, about halfway between black and white. The meter aims for it.
- **middle ground** (chapter 4): The part of the scene between the foreground and the background.
- **missed focus (out of focus)** (chapter 14): The camera made the wrong distance sharp, so the subject is soft and something else is sharp.
- **mixed light** (chapter 15): Two or more lights of different colors in one scene. One white balance can make only one of them neutral.
- **monochrome** (chapter 25): One color. In photography, black and white.
- **motion blur** (chapter 9): A moving thing smears in the photo, because it moved while the shutter was open.
- **motion picture film** (chapter 24): Film made for shooting movies, with flat, quiet color and lots of shadow detail.

N

- **near-duplicates** (chapter 30): Several photos of nearly the same thing, from working the scene or a burst. Keep the best one.
- **negative** (chapter 2): The developed film a photo is printed from.
- **negative space** (chapter 5): The empty part of the frame around the subject, like plain sky, a wall or bare ground.
- **neon sign** (chapter 41): A sign made of glowing colored glass tubes, or LED strips that look like them.
- **neutral** (chapter 15): With no color of its own: white, gray or black.
- **Night mode** (chapter 20): The iPhone Camera app's low-light mode. A yellow moon icon counts seconds while it takes frames to merge.
- **nitrate film** (chapter 32): Early film on a cellulose nitrate base, used until the early 1950s. It burns very easily and breaks down with age.
- **No Film (imports)** (chapter 29): Where imported photos arrive: a plain develop with no film look.
- **noise** (chapter 1): The fine grainy speckle in photos taken in low light.
- **noise reduction** (chapter 10): The phone smoothing noise away after the shot. Too much smears fine detail.
- **non-destructive editing** (chapter 26): The original photo is never changed. Edits sit on top of it in a small record and can be changed any time.

O

- **open shade** (chapter 7): Shade with open sky above or in front. The sky gives soft light.
- **open shadows (film card)** (chapter 35): The dark side of a face keeps detail instead of going black (Soft Portrait's card).
- **overediting** (chapter 26): Pushing sliders so far that you see the edit more than the photo.

- **overexposed** (chapter 8): The photo got too much light and looks too bright.

P

- **painting (watercolor) look** (chapter 20): Fine detail like leaves turned into flat patches with outlines. It comes from merging, noise reduction, sharpening and local tone mapping.
- **panning** (chapter 9): Moving the phone along with a moving subject while you shoot. The subject stays fairly sharp and the background streaks.
- **pattern** (chapter 6): A shape, line or color that repeats, like rows of windows or tiles.
- **Photo Size (in Chobial)** (chapter 17): Controls › Settings › Photo Size: Fast Capture 12MP (default), Balanced 24MP or Best Quality 48MP, where the cameras can give them. RAW, crops and bursts stay at 12 MP.
- **photo story (photo essay)** (chapter 30): A set of photos, in order, about one person, place or event.
- **Photographic Styles** (chapter 20): The iPhone Camera app's own color and tone choices. HEIF only, with a Tone setting on iPhone 16 and later.
- **photogravure** (chapter 37): A print made by etching a photo into a metal plate and printing it with ink.
- **Photonic Engine** (chapter 20): Apple's name (since iPhone 14, 2022) for running Deep Fusion earlier, before the image is compressed.
- **pixel** (chapter 1): One of the millions of tiny light-sensitive spots on the sensor.
- **plain RAW** (chapter 20): One frame straight from the sensor, with nothing merged. It's noisier and keeps natural texture (more in chapter 22).
- **platinum print** (chapter 26): A print made with platinum instead of silver, known for a long, soft range of grays.

- **portrait (shape)** (chapter 2): A frame that's taller than it is wide.
- **Portrait mode** (chapter 11): The phone camera app's mode that blurs the background in software after the shot. Chobial doesn't have one.
- **power bank** (chapter 39): A small battery that charges your phone.
- **ppi (pixels per inch)** (chapter 33): How many pixels sit side by side in one inch (2.54 cm) of a print. It's about 300 for prints seen up close and 150–200 for posters. It's often called dpi.
- **prefocus** (chapter 37): Setting the focus on a spot before your subject gets there. In Chobial, it's a hold on that spot (AF LOCK with the shutter set).
- **preset** (chapter 23): A saved set of slider moves, applied from wherever the photo already is.
- **ProRAW** (chapter 20): Apple's RAW on Pro iPhones. The frames are already merged and noise reduced. Tone mapping and sharpening are saved as settings you can change (more in chapter 22).

R

- **RAW** (chapter 0): The full data from the camera's sensor, before any color style is added.
- **RAW+JPEG** (chapter 29): A camera setting that saves a RAW and a JPEG of every shot, with the same name.
- **recompose (lock and recompose)** (chapter 19): Framing the picture again after you've locked focus and exposure.
- **red eye** (chapter 16): Red pupils in a flash photo, from flash light bouncing off the back of the eyes.
- **reel** (chapter 31): A short vertical video. In Chobial, it's one photo shown in one of four styles.
- **reflector** (chapter 7): Something white (paper, card, towel) that bounces light back into a shadow.

- **remote (remote shutter)** (chapter 18): Something that takes the photo without your hand on the phone, like Chobial's Apple Watch remote.
- **reportage** (chapter 37): Photos that report real events, like a news photographer's (Press's card).
- **roll (in Chobial)** (chapter 24): A set number of frames, 24 or 36, shot like a roll of film (Controls › Rolls).
- **rule of odds** (chapter 5): An old guideline that an odd number of things, like three, often looks better than two or four.
- **rule of thirds** (chapter 3): Put the subject on one of the lines (or crossings) that divide the frame into nine equal parts.

S

- **Save as Film** (chapter 28): Film tool › Save as Film turns a photo's film and edits into a film of your own. Clarity, dehaze, sharpening, masks, heals and crop stay with the photo.
- **scale** (chapter 44): How big something is compared with something else. A person shows a building's scale.
- **seeing in tones** (chapter 25): Looking at how bright things are instead of what color they are.
- **self-timer** (chapter 18): A delay between pressing the shutter and the photo being taken. In Chobial it's Controls › Timer (Off, 3s, 10s).
- **sensor** (chapter 0): The part of the camera that turns light into a picture.
- **sensor crop** (chapter 17): A "lens" that reads only the middle of a 48 MP sensor at full detail. It gives 2× from the main camera and 8× from the 17 Pro's 4× telephoto. At most 12 MP, with no RAW (ProRAW or HEIF).
- **sepia toning** (chapter 25): A chemical bath that turns a black-and-white print's grays warm brown.
- **shallow / deep depth of field** (chapter 11): Shallow: only a thin slice is sharp and the rest is soft. Deep: everything from near to far looks sharp.

- **sharp / soft** (chapter 14): Sharp: fine detail and clean edges. Soft: blurred.
- **sharpening** (chapter 20): Making edges look crisper, by making the light side of an edge lighter and the dark side darker.
- **shot list** (chapter 39): A list of the photos you plan to take.
- **shoulder** (chapter 23): The top part of the tone curve, where it bends toward white.
- **shutter speed** (chapter 0): How long the camera lets light in for each photo, like 1/125 s.
- **side light** (chapter 7): Light from the left or right of the subject. It shows shape and texture.
- **silhouette** (chapter 6): A subject that shows only as a dark shape against something bright.
- **slide film** (chapter 23): Film where the film in the camera becomes the finished picture, viewed with light through it or projected (more in chapter 24).
- **Smart HDR** (chapter 20): Apple's merging of several frames at different brightness, to keep detail in bright sky and shadows (since iPhone XS, 2018).
- **soft light** (chapter 7): Light from a big source close to the subject. It gives soft-edged shadows.
- **source (Heal)** (chapter 27): The place Heal or Clone copies from, shown as a dashed circle.
- **sprocket holes** (chapter 45): The small square holes along the edges of 35 mm film.
- **stabilization** (chapter 9): The lens or sensor moves to cancel small hand movements. Many phones' main cameras have it.
- **still life** (chapter 40): A picture of objects that don't move, like fruit, flowers or cups, arranged by the photographer.

- **stop** (chapter 8): One step in exposure. One stop more is twice the light, one stop less is half. Phones move in thirds.
- **straight (pure) photography** (chapter 26): Printing the photo as the camera and the light made it, with no painting, scratching or reworking.
- **street photography** (chapter 37): Photos of everyday life in public places (streets, markets, stations), usually of people who aren't posing.
- **subject** (chapter 2): The one main thing a photo is of.
- **Suits (film card)** (chapter 24): The line on a Chobial film's card naming the light it's made for (Films › ⓘ).
- **symmetry** (chapter 3): The left and right halves of a picture match, like a mirror.
- **sync** (chapter 32): Keeping the same photos on all your devices. A delete on one deletes on all, so it isn't a backup.

T

- **tabletop mode** (chapter 18): A foldable Android phone half folded and standing on a table. The picture is on the top half and the controls on the bottom.
- **telephoto lens** (chapter 17): A lens that makes faraway things look bigger. On phones it's 3×, 4× or 5×, with less light than the main camera.
- **test print** (chapter 33): One small print made first, to check brightness and color before printing the rest.
- **tint** (chapter 15): White balance's second direction, from green to magenta (purplish pink).
- **tone curve** (chapter 23): The rule that turns each brightness the sensor recorded into a brightness in the picture.
- **tones** (chapter 25): The steps of brightness in a black-and-white photo, from black through grays to white.
- **top light** (chapter 7): Light from almost straight above, like the noon sun. It gives dark eye sockets on a face.

- **tripod** (chapter 18): A stand with three legs that holds a camera still.
- **Tungsten (film in Chobial)** (chapter 16): A Pro film (badge TNG) modeled on tungsten-balanced movie film. It adds a cool, blue lean and a glow around lights.
- **tungsten light** (chapter 15): The warm light of old-style bulbs, whose tungsten wire glows. It's about 2700–3200 K.

U

- **ultra-wide lens** (chapter 4): The 0.5× lens. It fits much more of the scene (0.6× on some Android phones).
- **underexposed** (chapter 8): The photo got too little light and looks too dark.

V

- **vanishing point** (chapter 4): Where parallel lines, like rails, seem to meet in the distance.
- **vibrance / saturation** (chapter 26): Saturation makes every color stronger or weaker by the same amount. Vibrance gains most on muted colors and spares strong ones.
- **viewfinder** (chapter 0): The live picture on the screen that shows what the camera sees.
- **viewpoint** (chapter 6): Where the camera is: how high, how low, how near and from which side.
- **visual weight** (chapter 5): How strongly something in the photo pulls the eye.

W

- **warm / cool (color)** (chapter 15): Warm: orange, yellow or red. Cool: blue.
- **white balance** (chapter 15): A setting that tells the camera the color of the light, so white things look white (Controls › WB in Chobial).

- **WITHOUT FILM (peek)** (chapter 23): Touch and hold a film's name in Controls › Film to see the scene without the film. Let go to get it back.
- **working the scene** (chapter 6): Taking your first photo, then moving (closer, lower, higher, around) and shooting again.

Z

- **zebras (zebra stripes)** (chapter 13): Stripes over the parts of the viewfinder about to clip. In Chobial they're dark diagonal stripes (Controls › Guides › Zebras). The threshold is in Settings › Zebras, from 90 to 100%, 97% by default. **Settings › Zebras on › Any color** also stripes where one color clips.
- **zine** (chapter 33): A small, cheap booklet you make yourself, often folded and stapled.
- **Zone System** (chapter 13): Ansel Adams and Fred Archer's method (around 1940). It plans how bright each part of the scene will be in the print, from black to white.

Chobial screen map

Here's every button on the camera and in the editor, from top to bottom, on an iPhone with a Dynamic Island.

The camera



SCREENSHOT the camera screen with every part numbered to match the list

Top of the screen

1. **Format label**, left of the Dynamic Island: **ProRAW**, **RAW**, **HEIF** or **JPEG**. Tap it for the next one. It's RAW by default (chapters 0, 22).
2. **Film badge**, right of the Dynamic Island: the loaded film. Tap it for a row of all your films (chapters 0, 6). With rolls on, the frame count (like 12/36) shows in the left ear. Tap the count for the roll's card (chapters 24, 39).

On a phone without the island, the format and the badge sit in the exposure line.

3. **Exposure line**, under them: **ISO**, shutter and **EV**. Tap a value to open its dial. Orange means you set it, gray is the camera's, and red means the camera can't reach the brightness (chapters 0, 12). Other labels join it while they're on (chapters 14, 15, 16, 23, 39): - **MF**: focus set by hand. - The white balance value, like **Tungsten** or **3000K**. - **FLASH** or **FLASH AUTO**. - The frame shape, if it isn't 4:3. - **NO FILM**, when Live Film is off.

NO PHOTO in red means that lens or camera can't take a photo right now. Try another lens (chapter 0).

The picture

4. **The picture**: the scene, developed live in the loaded film (chapters 0, 6, 8, 19). - **Tap** to focus and meter on a spot. - **Drag up or down** after a tap to change EV. A sun shows beside the spot. - **Swipe left or right** to change the film. - **Touch and hold** for **AE/AF LOCK**, or **AF LOCK** when you set ISO or the shutter yourself. It shows in an orange label in the top left corner. Tap again to let go.
5. **White corners** around a person (or a pet on iPhone): tap inside them, and they turn green. Focus and exposure follow the subject (chapters 14, 35).
6. **Guides** on the picture, from **Controls › Guides** (chapters 3, 13, 14, 23): - **Grid**. - **Level**, which turns orange when the phone is straight. - **Histogram**, in the top right corner. - **Zebras**, stripes over parts about to clip. - **Live Film**. - **Peaking**, red lines on what's in focus. It's on by default. - While you focus by hand, a 4× loupe shows in a top corner.

Under the picture

7. **Flash**, the round button on the left: Off → Auto → On (chapter 16). It disappears on the front camera (chapter 36).
8. **Shutter**, in the middle: tap for a photo, hold for a burst. A burst is up to about five 12 MP photos a second, with a counter above the button. An orange arc inside the ring shows photos still developing. With the timer

on, "3s" or "10s" shows above it in orange, and a big countdown shows on the picture. Press again to cancel (chapters 0, 18, 36).

9. **Controls**, the round button with sliders on the right: opens the panel. A swipe up on the camera does the same. To put it away, swipe down, tap the black space around the picture, or tap **Controls** again (chapter 0).

The bottom

10. **Latest photo**, bottom left: opens the library. It says **ROLL DONE** when a roll is full (chapters 0, 24).
11. **Lens pill**, in the middle: **.5**, **1**, **2** and so on, depending on your phone (chapter 17).
12. **Flip**, bottom right: the front camera. Tap again to go back (chapter 0). On the iPhone Duo, the **Outer Screen** button next to it shows the picture to your subjects (chapter 36).

The Controls panel

- The tiles, in their first order (chapters 0, 2, 8, 9, 10, 14, 15, 18, 24):
- **Film**: the film row, and **Manage Films** for the Films list.
- **Exposure**: the EV dial, with **Reset**.
- **ISO** and **Shutter**: dials with **Auto** at the top right.
- **Focus**: NEAR to ∞, with **Auto**.
- **WB**: the white balance buttons.
- **Frame**: 4:3, 3:2, 1:1, 16:9, 65:24.
- **Format**.
- **Timer**: Off, 3s, 10s.
- **Rolls**: Off, 24, 36.
- **Guides**.
- **Settings**.
- **Focus**, **WB** and **Format** show only when the lens allows them (chapters 14, 15).

- **‹** goes back from a tile's page to all the tiles (chapter 9).
- **Back to Auto** shows when anything is set by hand. It gives it all back to the camera (chapter 12).
- Touch and hold a tile to move or hide tiles. **Done** finishes, and **Reset** puts them back. Film and Settings can't be hidden (not covered in a chapter).
- **Settings** has:
- The **Tutorial** (chapter 0).
- **Photo Size** (chapter 17).
- The **Zebras** threshold, and **Zebras on**: **Brightness** or **Any color** (chapters 13, 41).
- **Rolls** (chapter 24).
- **Describe Edits** on or off (chapter 28).
- iCloud **Sync Photos** (chapter 32).
- **After Capture › Save to Photos**, which needs Pro (chapter 31).

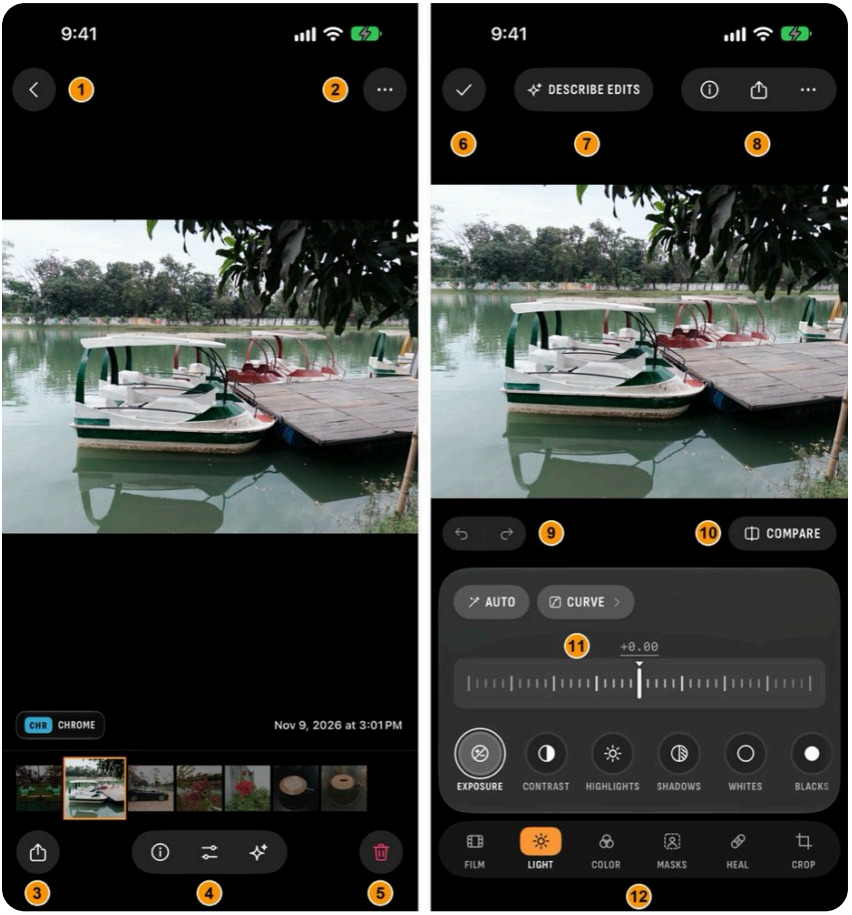
Other ways to shoot

- The volume buttons and Camera Control take a photo when you let go. Light-press Camera Control to bring up its controls. Light-press twice to choose **Film**, **Exposure**, **ISO** or **Shutter**, then slide along it (chapter 18).
- The Apple Watch app has a big shutter (chapters 18, 36).

On Android: the format and the film badge sit in the "ears" on either side of the camera hole. The formats are RAW, HEIF and JPEG, with no ProRAW, and RAW is saved as DNG. **NO RAW** in red means the lens has no RAW and takes HEIF or JPEG. Either volume key takes a photo when you let go. Holding one for about half a second locks focus and exposure on the middle of the picture. There's no Camera Control or Apple Watch. The lens pill shows the phone's own lenses, like .6, 1, 3 and 5, with no 2× sensor crop. Following tracks faces only. The **Shutter** and **ISO** tiles show only on lenses that let

apps set them. On a foldable, the **Cover Screen** button beside flip shows your subjects the picture. Tabletop mode puts the controls on the bottom half. Chobial for Android is in a closed beta (chapters 0, 9, 18, 19, 35, 36).

A photo and the editor



SCREENSHOT a photo open in the editor with every part numbered to match the list

Looking at a photo

1. ‹, top left: back to the library.

2. •••, top right: **Show Histogram**, **Reel from Edits…**, **Copy Edits…**, **Paste Edits** and **Reset All Edits** (chapters 13, 26, 31).
3. **Export**, bottom left: the export sheet, with **Frame**, **Caption**, **Location**, **Format** and **Size**, then **Save to Photos** or **Share**. The note under the tiles says Chobial never records where you take a photo. So **Location** only removes it from imported photos, and RAW files keep it (chapters 31, 34).
4. ⓘ, **Edit** and **Describe Edits**, together in the middle of the bottom. ⓘ (or a swipe up) shows the photo's details and the camera card. **Edit** opens the editor. **Describe Edits** lets you type or say how the photo should look (chapters 9, 26, 28).
5. **Delete** (the trash can), bottom right (chapter 30).

In the editor

6. **Checkmark**, top left: done. Edits save as you go (chapter 26).
7. **Describe Edits**, top middle (chapter 28).
8. ⓘ, **Export** and •••, top right (chapters 26, 31).
9. **Undo** and **redo**, bottom left of the photo. Hold undo to see every step and jump back. The last 30 steps stay with the photo (chapter 26).
10. **Compare**, bottom right of the photo. Tap it for a before-and-after slider. Hold it to see the photo before its film and edits (chapter 26).
11. **The ruler**: one slider per panel. Tap a setting in the row under it to put it on the ruler (filled orange). Double-tap the ruler to reset. Tap the number to type a value. Tap a changed setting again to turn it off for a moment (chapter 26).
12. **The tools**, along the bottom, in order:
    - **Film**: the film badges (Pro films have a small lock), **Save as Film** and **Reset Film**. Then **Strength**, **Grain**, **Bloom**, **Halation**, **Fade**, **Clarity**, **Dehaze** and **Sharpen** (chapters 24, 26, 28).
    - **Light**: **Exposure**, **Contrast**, **Highlights**, **Shadows**, **Whites** and **Blacks**, plus **Auto** and **Curve** (chapter 26).

- **Color**: **Temperature**, **Tint**, **Vibrance** and **Saturation**. **Mixer** has eight colored circles, each with **Hue**, **Saturation** and **Luminance**. **Grading** has **Shadow Hue**, **Shadow Amount**, **Highlight Hue**, **Highlight Amount** and **Balance** (chapters 26, 27).
- **Masks**: **New mask**, with found areas (like **Subject**, **Sky**, **Background**, **People**, **Face 1** and **Tap an Object**) and drawn ones (**Brush**, **Linear**, **Radial**, **Color** and **Luminance**). Saving needs Pro (chapter 27).
- **Heal**: **Heal** or **Clone**, with **Size** and **Feather**. Saving needs Pro (chapter 27).
- **Crop**: the shapes **Original**, **Free**, **1:1**, **5:4**, **4:3**, **7:5**, **3:2** and **16:9** (tap one again to switch tall and wide). Then **Rotate left**, **Rotate right**, **Mirror**, a straighten dial from −15° to +15°, and **Auto** (the level icon). Tap the orange checkmark at the top right to finish (chapters 26, 44).

13. An orange dot on a tool's tab means that tool changed the photo. Hold a tab to see the photo without that tool's changes. Each tool has a red ↺ reset (chapter 26).

On Android: everything works the same, but there's no ProRAW. **Save to Gallery** replaces **Save to Photos**. **Save as Film** asks for a name first, then opens the film editor. Describe Edits needs Gemini Nano, which only some phones have. **Auto** in Crop uses straight edges only, never a horizon (chapters 26, 28, 31, 44).