# Camera Basics for Generative Art I

An introduction to the exposure triangle.

# THE EXPOSURE TRIANGLE

You can approximate manual camera settings for shutter speed, aperture, and ISO through **descriptors**, though numerical data is currently Ignored by AI programs.
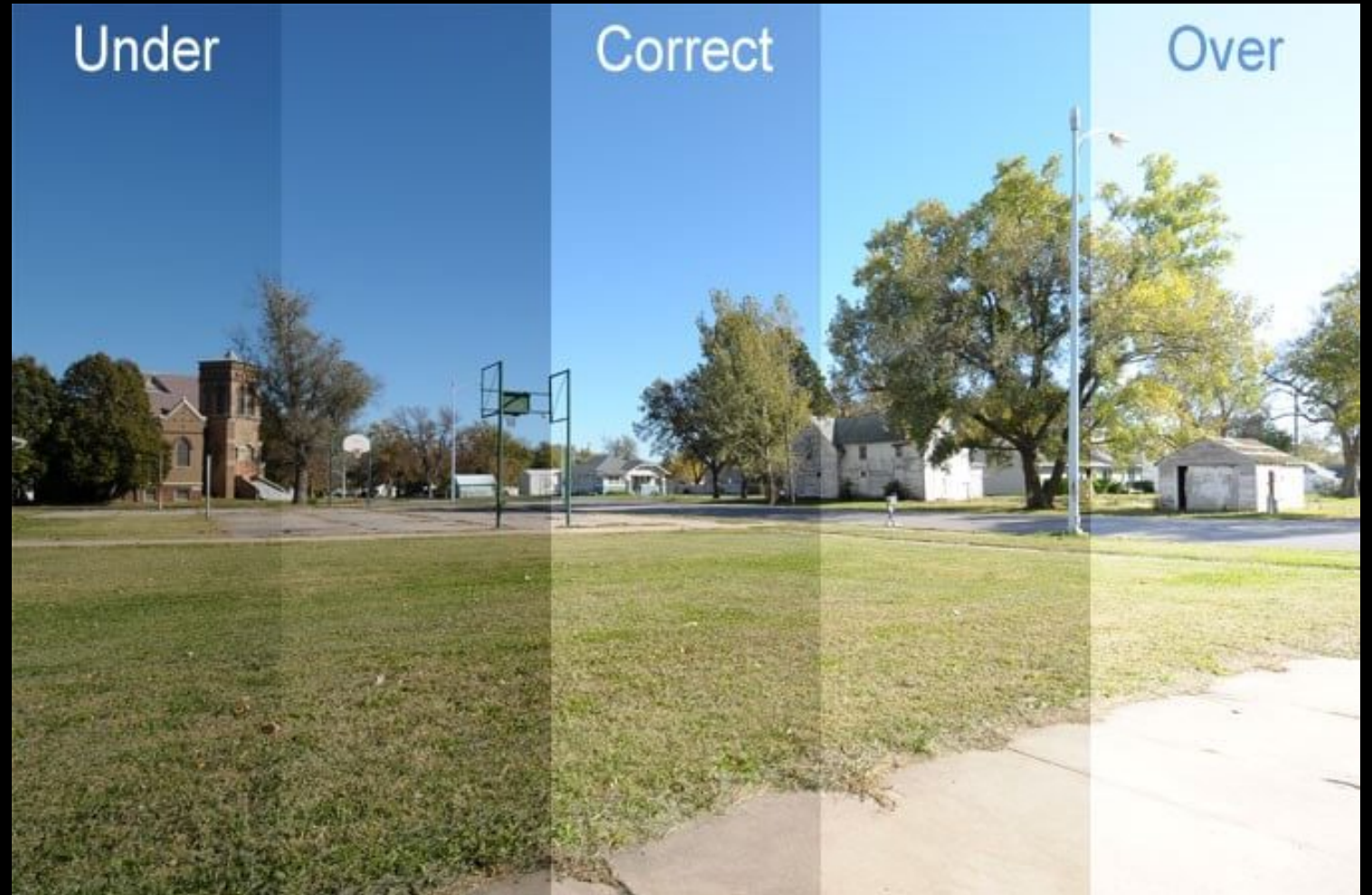
# What is the exposure triangle?

In photography, the **exposure triangle** explains the relationship between shutter speed, ISO and aperture. Whether you're shooting old school film or with a mirrorless, these three factors are at the center of every exposure.

Understanding the exposure triangle, also called the photographic triangle, will help you determine how a picture will look before you take it. And while saving film in today's digitally dominated world is probably not your first priority, knowing how aperture, shutter speed, and ISO work together to compose your image will make you a smarter, more efficient photographer.

With getting to know these variables, you'll also come to realize that, at least artistically, there is no one 'correct' exposure for a scene.

*https://www.polarpro.com/blogs/polarpro/the-three-elements-of-the-exposure-triangle*



*https://www.studiobinder.com/blog/what-is-overexposure-in-photography/*

# THERE ARE NO RULES, ONLY GUIDELINES:

Certain directors and cinematographers, such as David Lynch, David Fincher, and Roger Deakins, err on the side of low lighting and underexposing their work.  This can lead to dramatic and moody storytelling.  Other artists, such as Quentin Tarantino, Stanley Kubrick, and Janusz Kamiński, will play with overexposure, which can create a more transcendent look.  There is no right or wrong approach to an exposure aesthetic, so long as the visuals support the overall narrative.
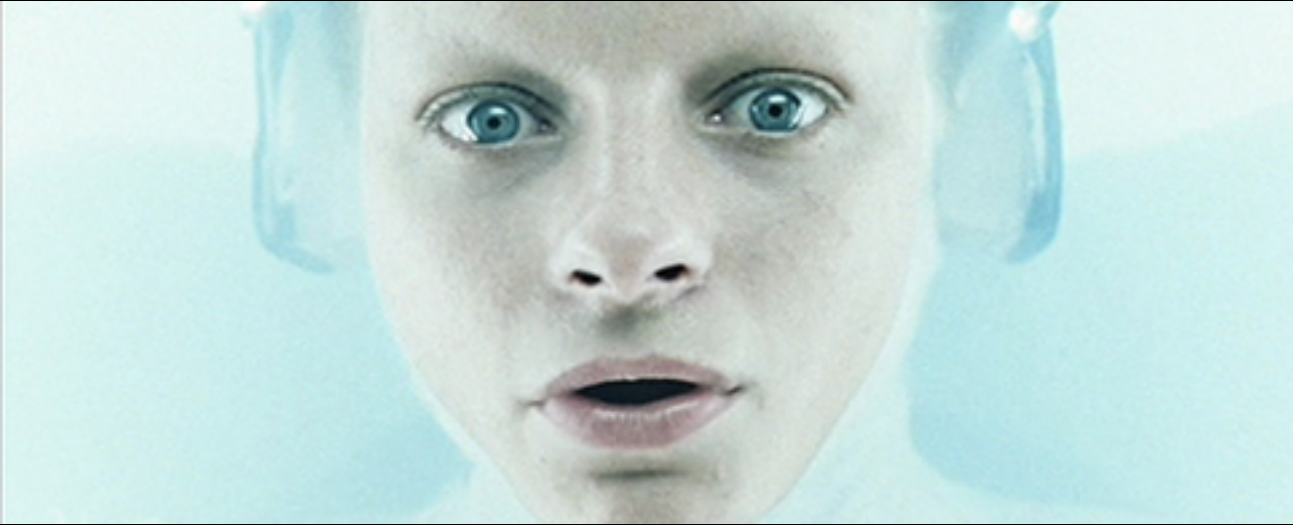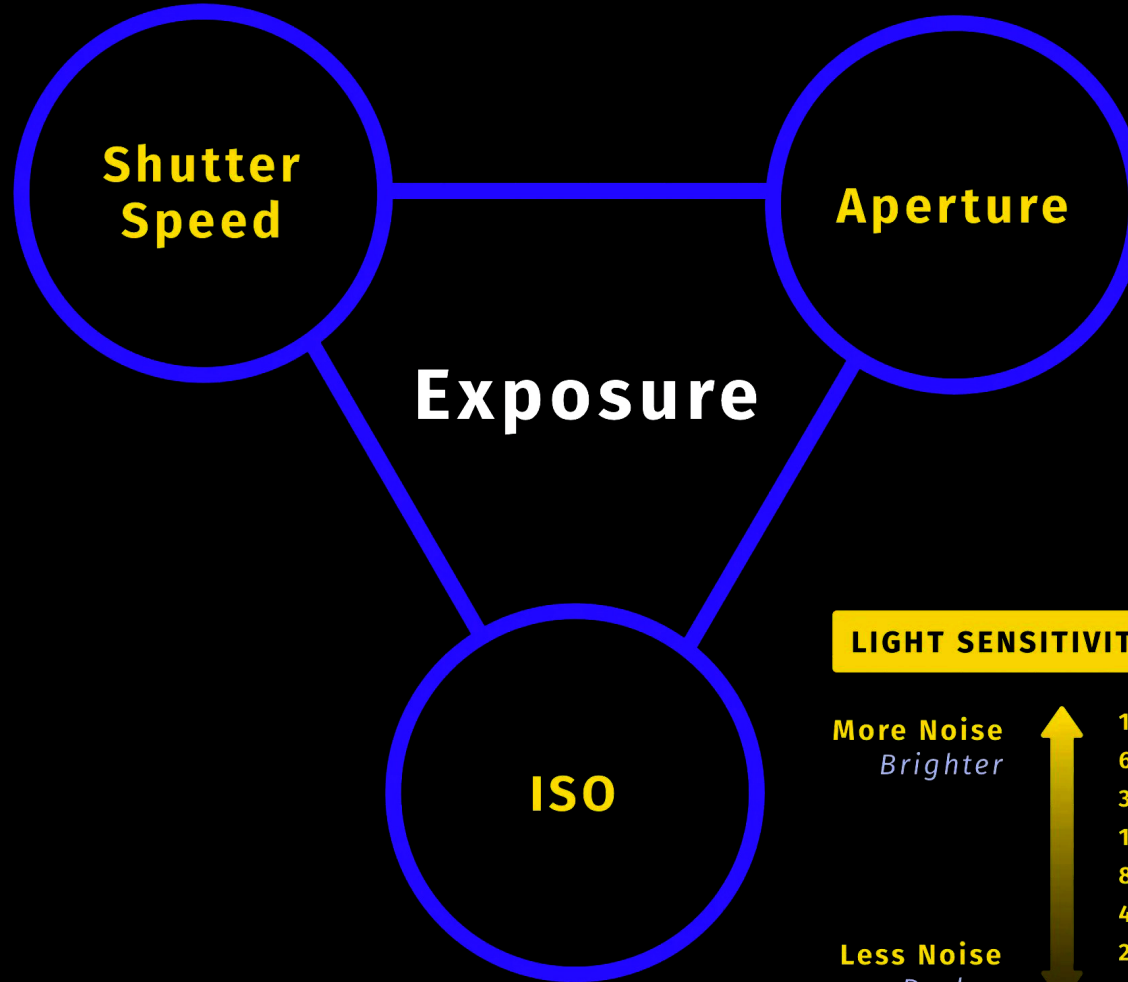
# THE EXPOSURE TRIANGLE:

**EXPOSURE TIME**

More Blur
*Brighter*

1/8
1/15
1/30
1/48
1/60
1/125
1/250
1/500
1/1000

Less Blur
*Darker*

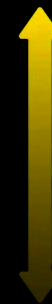**LENS OPENING**

*f*1.4
*f*2
*f*2.8
*f*4
*f*5.6
*f*8
*f*11
*f*16
*f*22

Shallow DOF
*Brighter*

Deep DOF
*Darker*

**Shutter Speed**

**Aperture**

## Exposure

**ISO**

**LIGHT SENSITIVITY**

More Noise
*Brighter*

12800
6400
3200
1600
800
400
200
100

Less Noise
*Darker*

*https://www.studiobinder.com/blog/what-is-the-exposure-triangle-explained/*

# SHUTTER SPEED

Speeding up the world and making it stand still.

## Aperture

small aperture → large aperture

| F22 | F16 | F11 | F8 | F5.6 | F4 | F2.8 | F2 | F1.4 |

## Shutter

fast shutter speed → slow shutter speed

| 1/1000 | 1/500 | 1/250 | 1/125 | 1/60 | 1/30 | 1/15 | 1/8 | 1/4 |

## ISO

low sensitivity → high sensitivity

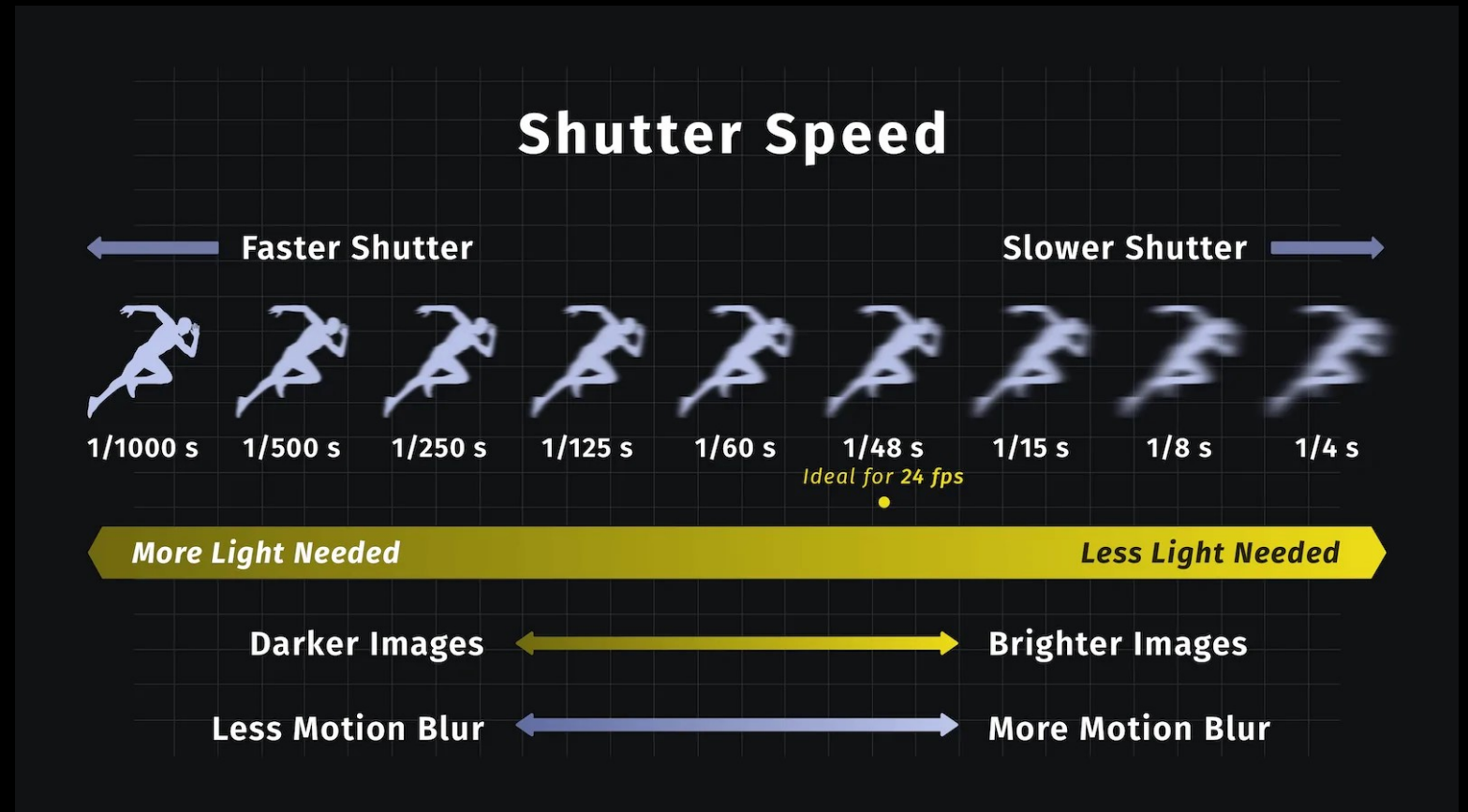| ISO 100 | ISO 200 | ISO 400 | ISO 800 | ISO 1600 | ISO 3200 | ISO 6400 | ISO 12800 | ISO 25600 |

# What is shutter speed?

**Shutter speed is how long the camera shutter is open, exposing the image to light, typically measured in milliseconds to minutes.** If the shutter is left open for a long time, a lot of light is being let in, which could overexpose the image. When there are moving subjects in your photo, a slow shutter speed could cause motion-blur. If the speed is quick, it's likely the picture will come out too dark.

These speeds are measured in fractions of a second. ½ means "one half of a second," while 1/250 means "one two-hundred-fiftieth of a second." The smaller the number (the higher the denominator), the faster the shutter speed. Conversely, the higher the number, like whole numbers from 1 to 30 seconds, are considered slow shutter speeds.  **Lastly, fast shutter speed creates a shallow depth of field.**

*https://www.studiobinder.com/blog/what-is-shutter-speed/*



## Shutter Speed

← Faster Shutter                    Slower Shutter →

| 1/1000 s | 1/500 s | 1/250 s | 1/125 s | 1/60 s | 1/48 s | 1/15 s | 1/8 s | 1/4 s |

*Ideal for 24 fps*

**More Light Needed** → **Less Light Needed**

Darker Images ← → Brighter Images

Less Motion Blur ← → More Motion Blur

# What does shutter speed control?

**Exposure** — depending the lighting conditions, a slow shutter will brighten the image and a fast shutter speed will darken it.

**Motion** — the slower the shutter speed, the more motion blur you'll create. The faster the shutter, the motion will appear sharp and jittery. The top image was shot at noon, and the dancers were moving quickly; in which case, I chose a fast shutter speed of 1/640 of a second. The revelers after a fireworks show in the image to the bottom right are expressed as a palimpsest of ghost-like figures, whereas the only person standing remains in focus. In order to get this shot, I set up a tripod and kept the shutter open for 2.5 seconds.

*https://www.studiobinder.com/blog/what-is-shutter-speed/*



Parasorudansu II • 14.3 x 9.5 • Hon-Atsugi, Japan • 8.6.2010 • f/13 • **1/640 sec** • 320 ISO • 170 mm • Nikon D300 • Jazno Francoeur



Jikan no Kawa • 12.6 x 7.5 • Hon-Atsugi, Japan • 8.6.2010 • f/6.3 • **2.5 sec** • 320 ISO • 18 mm • Nikon D300 • Jazno Francoeur

# What is the bulb mode on your camera?

Bulb mode is simply a shutter speed option that you can select in manual mode on your camera. It allows your shutter speed to be any length you choose: one second, one minute, 17 minutes, or anything else.

The key with bulb mode is that your camera's shutter stays open for as long as you hold down the shutter release button. The limit on your Bulb exposure depends on the camera – sometimes 30 minutes, sometimes as long as you like (or until your battery dies).  I left the shutter open 2.5 seconds with the bulb setting in the photo to the right.

*https://photographylife.com/bulb-mode*



Lantana •14.3 x 9.5 • Hon-Atsugi, Japan • 8.6.2010 • f/8 • 2.5 sec • 320 ISO • 95 mm • Nikon D300 • **Jazno Francoeur**

# What is a double or multiple exposure?

**Double exposure** is a technique that combines two different exposures or images that are layered on top of each other. The image overlaid is less than full opacity so a bit of both images can be seen producing an almost ghost-like image.

For digital photography, multiple or double exposure can be created in-camera or with editing programs like Photoshop. If you're using actual film, the photographer would have to expose the same part of the film twice, where the second image is being superimposed on the first one.

Why use the Double Exposure effect?
- In the early days, it was used to achieve special effects
- These days, double exposure photography is more of an aesthetic choice

https://www.studiobinder.com/blog/what-is-double-exposure-photography/



Still frame from the dream sequence in **Shelter in Place**, a short film I worked on with writer / director Clare Chun, screened at the 2023 Cannes Film Festival. This effect was achieved in Photoshop, staggering the timing so that there were three separate overlaying exposures in every frame.

**Can you express different types of exposures in AI-generated imagery through numerical manual setting prompts?** **No, but you can approximate lighting through descriptors and post-processing.**

**The results for numerical settings are inconsistent, and therefore not reliable**. **However, you can use descriptors to approximate types of exposures.** In the series of tests to follow this slide, the manual settings are all the same, except for **shutter speed**, which is variable from the bulb setting (2.5 seconds) to 1/10 of a second to 1/1000 of a second. The other settings, such as aperture and ISO, are also unreliable, as I will demonstrate later, but at least we are isolating one part of the exposure triangle in these tests. Here are the template prompts:

*Pass One:* *"Abraham Lincoln staring directly at viewer from shoulder view to top of head, perfectly centered, ISO 100, 85mm, f/4 aperture, [insert manual setting for shutter speed or descriptor here]--ar 2:1 --q 2 --v 5.1"*

*Pass Two:* *"Vermeer's Girl With a Pearl Earring, exact copy, ISO 100, 85mm lens, f/4 aperture, [insert manual setting for shutter speed or descriptor here] --ar 2:1 --q 2 --v5.1"*

In most cases, when I listed shutter speed, or even seconds with 'bulb setting,' the needle barely moved. There was more success when descriptors were used, such as **'extremely under exposed'** or **'extremely over exposed'**.

# ABRAHAM LINCOLN SHUTTER SPEED TESTS:

WHILE IMAGES SUGGEST SOME RESPONSE TO NUMERICAL DIFFERENCES, THESE RESULTS WERE ALSO SKEWED BY CHERRY-PICKING FROM THE GIVEN SET OF FOUR RENDERS.  THEY ARE ALSO NOT CONSISTENT AND DO NOT MATCH THE ACTUAL RESULTS FROM A MANUAL CAMERA, PARTICULARLY THE OPEN SHUTTER SETTING.  HOWEVER, OF ALL THE SETS I EXPERIMENTED WITH, THESE EXHIBIT AT LEAST SOME NOTICEABLE AND EXPECTED DIFFERENCES.



**Midjourney Bot** ✅ BOT  Today at 6:56 PM
Abraham Lincoln staring directly at viewer from shoulder view to top of head, perfectly centered, ISO 100, 85mm, f/4 aperture, shutter speed 1/10 of a second --ar 2:1 --q 2 --v 5.1 - Image #1 @jaznofrancoeur

**1/10**

**Midjourney Bot** ✅ BOT  Today at 6:59 PM
Abraham Lincoln staring directly at viewer from shoulder view to top of head, perfectly centered, ISO 100, 85mm, f/4 aperture, shutter speed 1/1000 of a second --ar 2:1 --q 2 --v 5.1 - Image #2 @jaznofrancoeur

**1/1000**

**Midjourney Bot** ✅ BOT  Yesterday at 6:52 PM
Abraham Lincoln staring directly at viewer from shoulder view to top of head, perfectly centered, ISO 100, 85mm, f/4 aperture, overexposed --ar 2:1 --q 2 --v 5.1 - Image #1 @jaznofrancoeur

**Over-Exposed**

**Midjourney Bot** ✅ BOT  Today at 7:11 PM
Abraham Lincoln staring directly at viewer from shoulder view to top of head, perfectly centered, extremely over exposed --ar 2:1 --q 2 --v 5.1 - Image #4 @jaznofrancoeur

**Extremely Over-exposed**

**Midjourney Bot** ✅ BOT  Today at 7:06 PM
Abraham Lincoln staring directly at viewer from shoulder view to top of head, perfectly centered, ISO 100, 85mm, f/4 aperture, bulb setting --ar 2:1 --q 2 --v 5.1 - Image #3 @jaznofrancoeur

**2.5 Seconds (Bulb Setting)**

**Midjourney Bot** ✅ BOT  Today at 2:42 PM
Abraham Lincoln staring directly at viewer from shoulder view to top of head, perfectly centered, ISO 100, 85mm, f/4 aperture, extremely underexposed --ar 2:1 --q 2 - Image #4 @jaznofrancoeur

**Underexposed**

# SIDE-BY-SIDE USING DESCRIPTORS:

DESCRIPTORS FOR **LONG SHUTTER SPEED** AND **SHORT SHUTTER SPEED** WORK INCONSISTENTLY, AS EXAMPLES ARE CHERRY-PICKED FROM ONE OF FOUR RENDERS (PER PROMPT).

Abraham Lincoln staring directly at viewer from shoulder view to top of head, perfectly centered, ISO 100, 85mm, f/4 aperture, **extremely long shutter speed** --ar 2:1 --v 5.2

Abraham Lincoln staring directly at viewer from shoulder view to top of head, perfectly centered, ISO 100, 85mm, f/4 aperture, **extremely short shutter speed** --ar 2:1 --q 2

# SIDE-BY-SIDE USING DESCRIPTORS:

DESCRIPTORS FOR **OVER EXPOSURE** AND **UNDER EXPOSURE** WORK BETTER, BUT STILL NOT WITH 100% CONSISTENCY.

Abraham Lincoln staring directly at viewer from shoulder view to top of head, perfectly centered, ISO 100, 85mm, f/4 aperture, **overexposed** --ar 2:1 --q 2 --v 5.1

Abraham Lincoln staring directly at viewer from shoulder view to top of head, perfectly centered, ISO 100, 85mm, f/4 aperture, **extremely underexposed** --ar 2:1 --q 2

# 'GIRL WITH A PEARL EARRING' SHUTTER SPEED TESTS:

EVEN CHERRY-PICKING THE FOUR-RENDER SETS DID NOT YIELD VIABLE RESULTS. THERE ARE NOTICEABLE DIFFERENCES BETWEEN 1/10 OF A SECOND, OVER-EXPOSED, AND UNDEREXPOSED. BUT OTHERWISE, THERE IS NO INDICATION THAT THE NUMERICAL SHUTTER SPEEDS WERE CONSIDERED ACCURATELY. THE RESULTS COULD ALSO BE SKEWED BY THE FACT THAT THE PAINTING HAS SET LIGHTING AND THE PROMPT STATES 'EXACT COPY'.



1/10



1/1000



Over-Exposed



Extremely Over-Exposed



2.5 Seconds (Bulb Setting)



Extremely Underexposed

# SIDE-BY-SIDE USING DESCRIPTORS:

DESCRIPTORS FOR **LONG SHUTTER SPEED** AND **SHORT SHUTTER SPEED** WORK INCONSISTENTLY, AS EXAMPLES ARE CHERRY-PICKED FROM ONE OF FOUR RENDERS (PER PROMPT).

Vermeer's Girl With a Pearl Earring,
exact copy, ISO 100, 85mm, f/4 aperture,
**extremely long shutter speed** --ar 2:3 --v 5.1

Vermeer's Girl With a Pearl Earring,
exact copy, ISO 100, 85mm, f/4 aperture,
**extremely short shutter speed** --ar 2:3 --v 5.1

# SIDE-BY-SIDE USING DESCRIPTORS:

DESCRIPTORS FOR **OVER EXPOSURE** AND **UNDER EXPOSURE** WORK BETTER, BUT STILL NOT WITH 100% CONSISTENCY.



Vermeer's Girl With a Pearl Earring,
exact copy, ISO 100, 85mm, f/4 aperture,
**overexposed** --ar 2:3 --q 2 --v 5.1

Vermeer's Girl With a Pearl Earring,
exact copy, ISO 100, 85mm, f/4 aperture,
**extremely underexposed** --ar 2:3 --q 2 --v 5.1

# SHORT EXPOSURE DESCRIPTORS, MIKE TYSON:

MIKE TYSON BOXING WITH EVANDER HOLYFIELD, **FREEZE FRAME**, **SPORT ACTION PHOTOGRAPHY**, CLOSE-UP, DRAMATIC ANGLE, CINEMATIC COLOR --AR 2:1 --V 5.2  **[MIDJOURNEY 5.2]**

# LONG EXPOSURE DESCRIPTORS, MIKE TYSON:

MIKE TYSON BOXING WITH EVANDER HOLYFIELD, CLOSE-UP, DRAMATIC ANGLE, CINEMATIC COLOR, **MOTION BLUR, TIME LAPSE, MULTIPLE EXPOSURE** --AR 2:1 --V 5.2 **[MIDJOURNEY 5.2]**

# SHORT EXPOSURE DESCRIPTORS, ROLLER DERBY GIRLS:

SHATTERED GLASS, **FREEZE FRAME,** A TATTOOED AFRICAN-AMERICAN ROLLER DERBY DIVA SMASHING HEADFIRST THROUGH FIERY GLASS, EXPLOSIVE GLASS SHARDS EVERYWHERE, EXTREME PERSPECTIVE, CINEMATIC COMPOSITION, SUBSURFACE SCATTERING, DAPPLED NEON LIGHTS, ELLIPTICAL LENS FLARE, MOODY LIGHTING –AR 2:1 --V 5.1  **[MIDJOURNEY 5.1]**

# LONG EXPOSURE DESCRIPTORS, ROLLER DERBY GIRLS:

HTTPS://S.MJ.RUN/IG-EHKGDPGS SHATTERED GLASS, **MOTION BLUR, MULTIPLE EXPOSURE, TIME LAPSE**, A TATTOOED AFRICAN-AMERICAN ROLLER DERBY DIVA SMASHING HEADFIRST THROUGH FIERY GLASS, EXPLOSIVE GLASS SHARDS EVERYWHERE, EXTREME PERSPECTIVE, CINEMATIC COMPOSITION, SUBSURFACE SCATTERING, DAPPLED NEON LIGHTS, ELLIPTICAL LENS FLARE --SEED 2235705274 --AR 2:1 --V 5.2  **[MIDJOURNEY 5.2]**

SHORT EXPOSURE DESCRIPTORS, NAT GEO SERIES:

EAGLE CATCHING FISH IN WATER, **SUPER SHARP FOCUS, FREEZE FRAME, SHALLOW DEPTH OF FIELD, NAT GEO,** DAPPLED LIGHT, EXTREME REALISM, CINEMATIC COLOR, CINEMATIC ANGLE --AR 2:1 --V 5.2 **[MIDJOURNEY 5.2]**

# LONG EXPOSURE DESCRIPTORS, NAT GEO SERIES:

EXTREME BLUR, **MULTIPLE EXPOSURE,** EAGLE CATCHING FISH IN WATER, **MOTION BLUR, TIME LAPSE**, GOLDEN HOUR, EXTREME REALISM, CINEMATIC COLOR, CINEMATIC ANGLE --AR 2:1 --SEED 3827441425 --V 5.2 **[MIDJOURNEY 5.2]**

# SHORT EXPOSURE DESCRIPTORS, THE LAKHIYANA:
A 70-YEAR-OLD GABBAR SINGH IN A FUTURISTIC RED SPACESUIT-SHERWANI STANDING WITH SIX OTHER RULERS IN PURPLE FUTURISTIC SHERWANI, SHARP-FOCUS, DIFFUSE-BACK-LIGHTING, FACING-CAMERA, LOW-CONTRAST, FACIAL-SYMMETRY, **PORTRAIT** --AR 3:2 --V 4 --Q 2  **[MIDJOURNEY 4]**

# LONG EXPOSURE DESCRIPTORS, THE LAKHIYANA:

70-YEAR-OLD GABBAR SINGH IN A FUTURISTC RED SPACESUIT-SHERWANI DANCING WITH SIX OTHER RULERS IN PURPLE FUTURISTIC SHERWANI, **MOTION BLUR, TIME LAPSE, MULTIPLE EXPOSURE, FRENZIED ACTION**, DIFFUSE BACK-LIGHTING, LOOKING-INTO-CAMERA --AR 3:2 --SEED 3418354869 --V 5.2  **[MIDJOURNEY 5.2]**

# APERTURE

The size of the aperture opening determines both exposure and the depth-of-field (DOF).

## Aperture

small aperture | large aperture

| F22 | F16 | F11 | F8 | F5.6 | F4 | F2.8 | F2 | F1.4 |

## Shutter

fast shutter speed | slow shutter speed

| 1/1000 | 1/500 | 1/250 | 1/125 | 1/60 | 1/30 | 1/15 | 1/8 | 1/4 |

## ISO

low sensitivity | high sensitivity

| ISO 100 | ISO 200 | ISO 400 | ISO 800 | ISO 1600 | ISO 3200 | ISO 6400 | ISO 12800 | ISO 25600 |

# What is aperture?

**Aperture is the opening of the lens through which light passes.** When you hit the shutter release button to take the picture, the camera aperture opens to the predetermined width, letting a specific amount of light through. A large aperture lets more light in, and vice versa. **Aperture is calibrated in f/stops**, written in numbers like 1.4, 2, 2.8, 4, 5.6, 8, 11 and 16. The larger the number, the narrower the aperture.

*https://www.studiobinder.com/blog/what-is-aperture/*



*https://sabo-pr.com/2019/09/09/lessons-learned-after-picking-up-my-first-camera/*

# F-STOP CHART

| APERTURE | FULL STOP | 1/2 STOP | 1/3 STOP | DEPTH OF FIELD | LIGHT | SWEET SPOT |
|----------|-----------|----------|----------|----------------|-------|------------|
| | f/1.0 | f/1.0 | f/1.0 | | | |
| | | f/1.2 | f/1.1 | | | |
| | | | f/1.2 | | | |
| | f/1.4 | f/1.4 | f/1.4 | | | |
| | | | f/1.6 | | | |
| | | f/1.7 | f/1.8 | | | |
| | f/2 | f/2 | f/2 | | | |
| | | | f/2.2 | | | |
| | | f/2.4 | f/2.5 | | | |
| | f/2.8 | f/2.8 | f/2.8 | | | |
| | | | f/3.2 | | | |
| | | f/3.3 | f/3.5 | | | |
| | f/4 | f/4 | f/4 | | | |
| | | | f/4.5 | | | |
| | | f/4.8 | f/5 | | | |
| | f/5.6 | f/5.6 | f/5.6 | | | |
| | | | f/6.3 | | | |
| | | f/6.7 | f/7.1 | | | |
| | f/8 | f/8 | f/8 | | | |

f/1.4

f/2.0

f/2.8

f/4.0

f/5.6

f/8.0

# Night vs. Day

These are the two tallest structures in the world, but taken under very different circumstances.

I took the first picture in fog and with low light with no flash or tripod.  To get this effect, I used the widest aperture, F/1, with a shutter speed at 1/60 of a second, open long enough to let in light without blur.  Lastly, I pushed the ISO to 1600, just at the cusp of creating a grainy look.

I took the second picture at high noon with a cloudless sky, which meant a very low ISO, an extremely fast shutter speed (as I was aiming near the sun), and an f stop of 3.5.
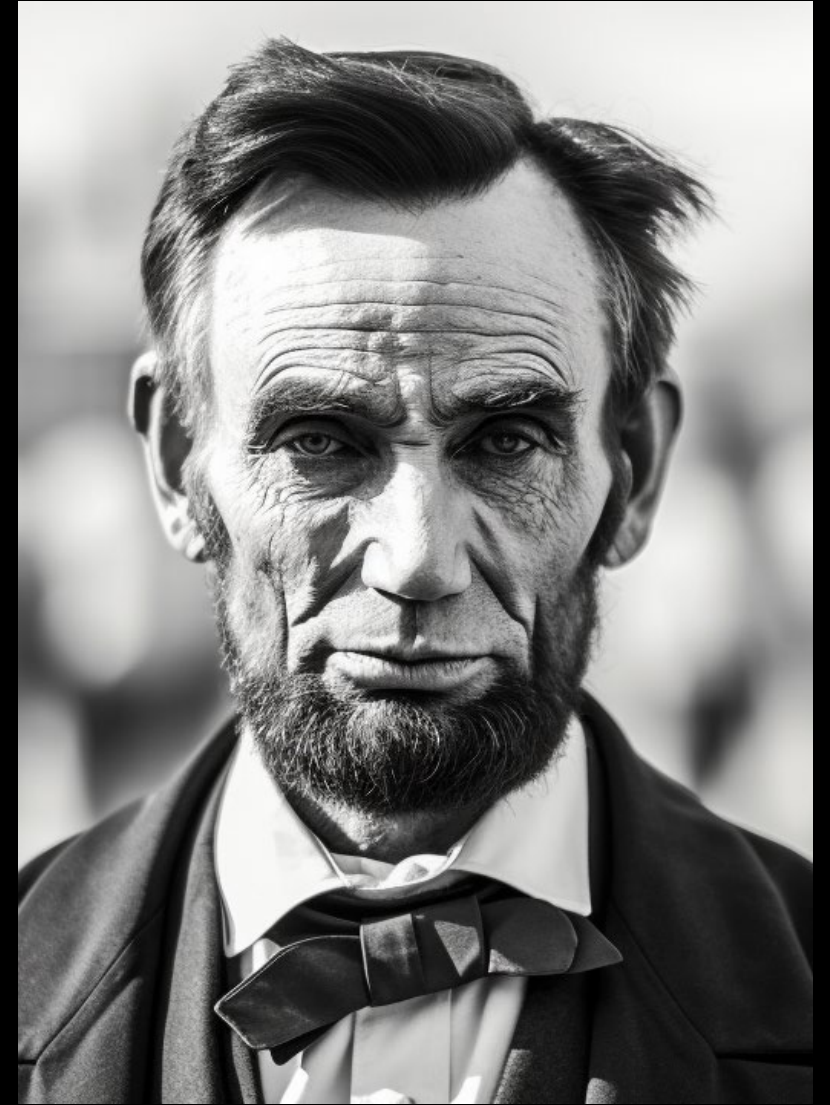
**Can you express *ƒ* stops in AI-generated imagery through numerical manual setting prompts?** **No, but you can approximate lighting and depth of field (DOF) through descriptors and post-processing.**

**The results for numerical settings are inconsistent, and therefore not reliable.** **However, you can use descriptors to approximate different *ƒ* stops.** In the series of tests to follow this slide, the manual settings are all the same, except for the **aperture**, which is variable from f/1.4 to f/22. The remaining setting in the exposure triangle, ISO, is also unreliable, as I will demonstrate later, but at least we are isolating one part of the exposure triangle in these tests. Here is the template prompt:

*Pass One:* *"Abraham Lincoln staring directly at viewer from shoulder view to top of head, perfectly centered, ISO 100, 85mm, f/4 aperture, [insert manual setting for shutter speed or descriptor here] --ar 2:1 --q 2 --v 5.1"*

There was more success when descriptors were used, such as **'bokeh'** or **'shallow depth of field'**.

# EXPOSURE DESCRIPTORS:
BY REPLACING F STOPS WITH DESCRIPTORS, YOU CAN GET SUBTLE EXPOSURE APPROXIMATIONS.
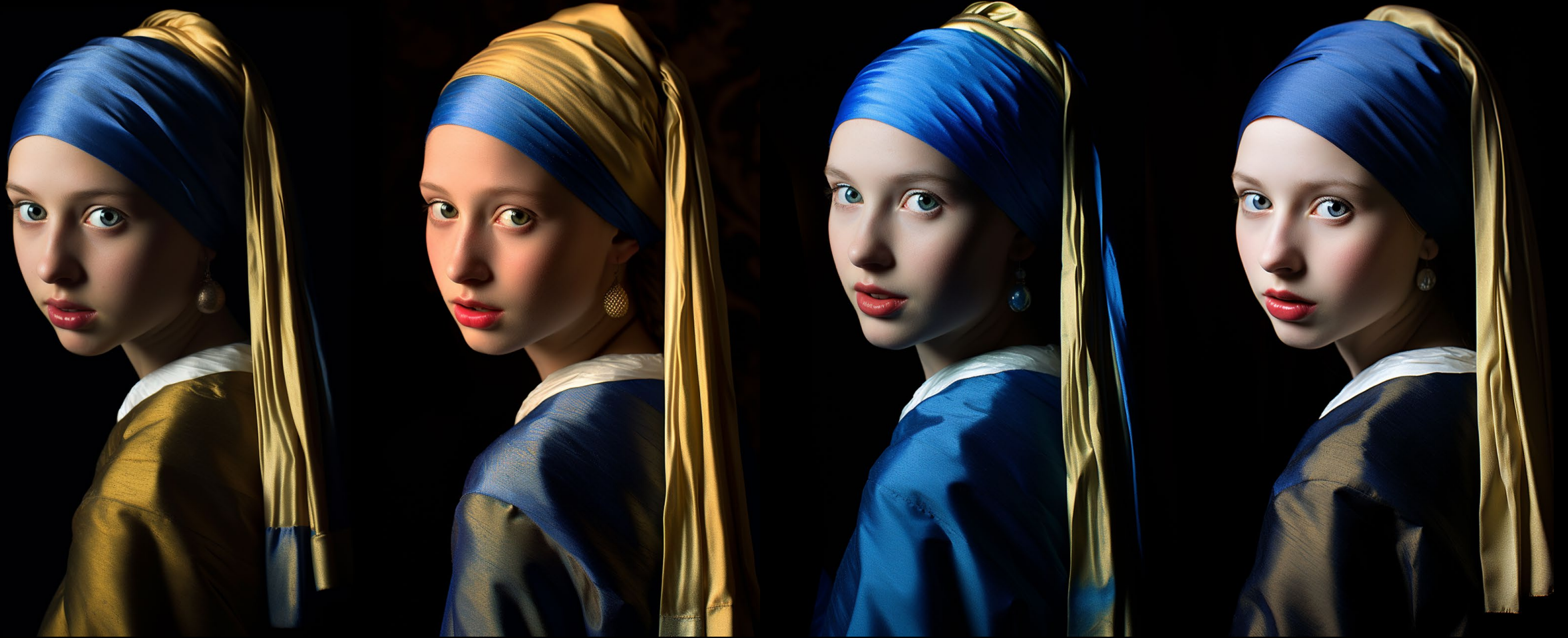
Chiaroscuro          Moonlight          Sunlight          Bloom

# EXPOSURE DESCRIPTORS:

BY REPLACING F STOPS WITH DESCRIPTORS, YOU CAN GET SUBTLE EXPOSURE APPROXIMATIONS.

Low Light

Candle Light

Flood Light

Klieg Light

# HIGHER ƒ STOP DESCRIPTORS, THE LAKHIYANA:

CHIAROSCURO, LOW LIGHTING, A 45 YEAR OLD POPE WHO RESEMBLES DEV ANAND HOLDING MASS IN A FUTURISTC CATHEDRAL IN FUTURISTIC VESTMENTS BLESSING A BEAUTIFUL 30-YEAR-OLD FEMALE CLERIC FROM THE FUTURE WEARING A CARDINAL'S RED HAT AND COSTUME WHO RESEMBLES CHARITHRA CHANDRAN AND ZHANG ZILIN, VAN HERPEN STYLE, DIFFUSE-BACK-LIGHTING, LOW-CONTRAST --AR 2:1 --V 5.2  [MIDJOURNEY 5.2]

# MEDIUM ƒ STOP DESCRIPTORS, THE LAKHIYANA:

**MODERATE LIGHTING, MEDIUM WATTAGE INCANDESCENT LIGHT**, A 45 YEAR OLD POPE WHO RESEMBLES DEV ANAND IN A FUTURISTC CATHEDRAL IN FUTURISTIC VESTMENTS BLESSING A BEAUTIFUL 30-YEAR-OLD FEMALE CLERIC FROM THE FUTURE WEARING A CARDINAL'S RED HAT AND COSTUME WHO RESEMBLES CHARITHRA CHANDRAN AND ZHANG ZILIN, VAN HERPEN STYLE, DIFFUSE-BACK-LIGHTING, LOW-CONTRAST --AR 2:1 --V 5.2  **[MIDJOURNEY 5.2]**

# HIGHER ꜰ STOP DESCRIPTORS, THE LAKHIYANA:

PROFILE VIEW OF A WEEPING EAST INDIAN BRIDE WITH HOLOGRAPHIC CHLADNI-STYLE VEIL AND DRESS MADE OF LASER LIGHT AND HOLOGRAMS, INCENSE-FILLED ROOM, **CANDLE LIGHT**, FLOWERS, STYLE OF **BLADE RUNNER 2049**, SHARP-FOCUS, **DIFFUSE-BACK-LIGHTING** --AR 3:2 --V 5 --Q 2  **[MIDJOURNEY 5]**

REFLECTION OF A WEEPING ASIAN TEEN TOUCHING REFLECTIVE CASKET WITH BOUNCED HOLOGRAPHIC CHLADNI-STYLE LASER LIGHT, INCENSE-FILLED ROOM, **CANDLE LIGHT**, FLOWERS, STYLE OF **BLADE RUNNER 2049**, SHARP-FOCUS, **DIFFUSE-BACK-LIGHTING** --AR 3:2 --V 5 --Q 2  **[MIDJOURNEY 5]**

# HIGHER ƒ STOP DESCRIPTORS, THE LAKHIYANA:
AN ANTHROPOMORPHIZED GRIZZLY BEAR NAMED JAMBAVAN WITH BLUE FUR FROM HEAD TO FOOT WITH NOBLE HINDU NOBLE PRIESTLY FACE GIVING TEA TO DEV PATEL IN A DIMLY LIT PRISON CELL, BALOO FROM JUNGLE BOOK CROSSED WITH SHAH RUKH KHAN, **CHIAROSCURO**, **DIFFUSE-BACK-LIGHTING**, LOW-CONTRAST, HIGH-SHARPNESS, **DEEP FOCUS** --AR 2:1 --V 5 --Q 2 **[MIDJOURNEY 5]**

# LOWER ƒ STOP DESCRIPTORS, THE LAKHIYANA:

A HOLOGRAPHIC MAN IN A RESPLENDENT FUTURISTIC PORTRAIT GALLERY WHO RESEMBLES AMITABH BACHCHAN WITH FUTURISTIC INDIAN REGAL SHERWANI, BLUE EYES, WHITE BEARD, THINNING HAIR, EXQUISITE DETAIL, PROFILE VIEW, **BRIGHT BACK LIGHT, BOUNCED WHITE LIGHT** --AR 3:2 --V 5.2  **[MIDJOURNEY 5.2]**

A HOLOGRAPHIC MAN IN A RESPLENDENT FUTURISTIC PORTRAIT GALLERY WHO RESEMBLES AMITABH BACHCHAN WITH FUTURISTIC INDIAN REGAL SHERWANI, BLUE EYES, WHITE BEARD, THINNING HAIR, EXQUISITE DETAIL, PROFILE VIEW, **KLIEG LIGHT, JANUSZ KAMIŃSKI** --AR 3:2 --V 5.2  **[MIDJOURNEY 5.2]**

LOWER ғ STOP DESCRIPTORS, THE LAKHIYANA:
A TALL BLONDE MAN WITH A LARGE NOSE WHO RESEMBLES STEVE BUSCEMI WEARING AN AFRICAN SHAWL PLAYING A TALKING DRUM WHILE DANCING AROUND A SUN ALTAR WITH A 20-YEAR-OLD MAN RESEMBLING YEMI SOLADE IN FUTURISTIC SPACE SUIT WITH SOLAR MOTIFS, **DAY TIME, HIGH NOON,** DANCING CROWDS, WORM'S EYE VIEW, DYNAMIC DANCING POSES, DUTCH ANGLE --AR 3:2 --V 5.2  **[MIDJOURNEY 5.2]**

# DEPTH OF FIELD

Depth of field is the area of acceptable
sharpness in front of and behind the subject
which the lens is focused.

# What is depth of field?

**Depth of field (DOF)** is the term used to describe the *size of the area* in your image where objects appear acceptably sharp. The area in question is known as the *field*, and the size (in z-space) of that area is the *depth* of that field. DOF is governed by the angle at which light rays enter the lens. The larger your camera sensor, the more your depth of field decreases. This is because you are forced to move closer to your subject to fill your frame. You can manipulate your DOF through aperture, and focus distance.

The center most point of the field is known as the *point of focus*. The imaginary two dimensional plane that extends from that point is known as the *plane of focus*. Any part of your image that falls directly on this plane is officially *in focus*.

*https://www.studiobinder.com/blog/depth-of-field*
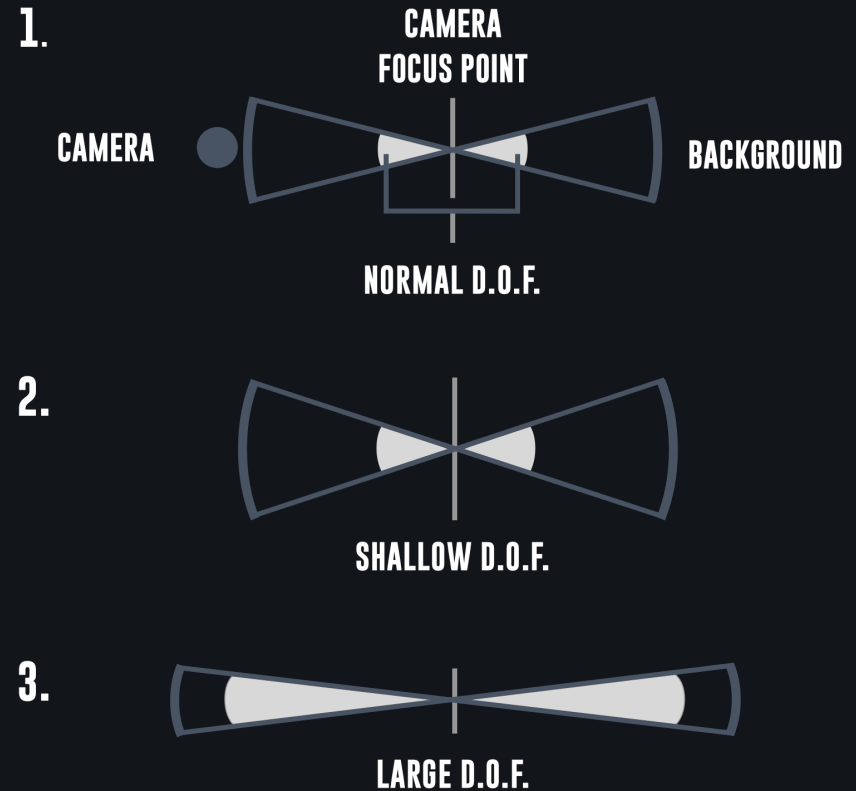
# SHALLOW DOF TEST, SAN FRANCISCO SERIES:

**TELEPHOTO LENS, SHALLOW DOF,** WOMAN WITH GLASSES IN THE STYLE OF THE SAN FRANCISCO RENAISSANCE, LIGHT TEAL AND LIGHT WHITE, CHINESE NEW YEAR FESTIVITIES, STREET STYLE, CITYSCAPE --AR 2:1 --V 5.2  **[MIDJOURNEY  5.2]**

# MEDIUM DOF TEST, SAN FRANCISCO SERIES:

**MEDIUM DOF**, WOMAN WITH GLASSES AND A SHIRT, IN THE STYLE OF THE SAN FRANCISCO RENAISSANCE, LIGHT TEAL AND LIGHT WHITE, CHINESE NEW YEAR FESTIVITIES, STREET STYLE, CITYSCAPE --AR 2:1 --V 5.2 **[MIDJOURNEY 5.2]**

**DEEP FOCUS TEST, SAN FRANCISCO SERIES:**

WIDE ANGLE LENS, ALL ELEMENTS IN SHARP FOCUS, WOMAN WITH GLASSES IN THE STYLE OF THE SAN FRANCISCO RENAISSANCE, LIGHT TEAL AND LIGHT WHITE, CHINESE NEW YEAR FESTIVITIES, STREET STYLE, CITYSCAPE --AR 2:1 --V 5.2 [MIDJOURNEY 5.2]

# SHALLOW DOF, TIFFANY + CHIHULY WATER SERIES:
WATER SPLASH IN THE STYLE OF TIFFANY GLASS AND GAUDI, CURATED COLLECTION, TRANSPARENT, BACKLIT, GOLDEN HOUR, **SHALLOW DEPTH OF FIELD**
[MIDJOURNEY 4]

# SHALLOW DOF, THE LAKHIYANA:
DEV PATEL IN A DHOTI STANDING OVER A DEFEATED TIGER WARRIOR IN A FUTURISTIC ZAHA HADID STYLED PRISON OCTAGON LIKE GLADIATORS, GOD RAYS AND DUST, WORM'S EYE VIEW, INTRICATELY-DETAILED, DIFFUSE-BACK-LIGHTING, SMALL-CATCHLIGHT, LOW-CONTRAST, **SHALLOW DOF** --AR 3:2 --V 4 --Q 2  **[MIDJOURNEY 5]**

# DEEP FOCUS, THE LAKHIYANA:

A FUTURISTIC CITY INSIDE A SUPERMASSIVE HANGAR, STYLE OF FRANK GEHRY AND ZAHA HADID, WORM'S EYE VIEW, **WIDE ANGLE, DRAMATIC LIGHTING, DEEP FOCUS,** MOVIE COMPOSITION, CINEMATIC COLOR, DRAMATIC ANGLE, WARM KEY LIGHT, BLUE FILL LIGHT --V 4 --AR 3:2 --Q 2 **[MIDJOURNEY 4]**

A FUTURISTIC CITY INSIDE A SUPERMASSIVE HANGAR, STYLE OF FRANK GEHRY AND ZAHA HADID, WORM'S EYE VIEW, **WIDE ANGLE, DRAMATIC LIGHTING, DEEP FOCUS,** MOVIE COMPOSITION, CINEMATIC COLOR SCHEME, WARM KEY LIGHT, BLUE FILL LIGHT--V 4 --AR 3:2 --Q 2 **[MIDJOURNEY 4]**

# DEEP FOCUS, AFRO FUNK DJ SERIES:

WORM'S EYE VIEW, **WIDE ANGLE, DEEP FOCUS**, HYPER REALISM WITH GRAPHICAL RETRO 60'S MUSIC POSTER OF DANCING CHINESE AFRO FUNK FEMALE DJ SHOW IN TEA HOUSE, DRAGON AND TIGER MOTIFS, ELEGANT, GLOWING CHINESE LANTERNS MORPHED INTO DISCO BALLS, CANDLE LIGHT, DRAMATIC ANGLE, EXTREME PERSPECTIVE, DIFFUSE-BACK-LIGHTING --AR 2:1 --V 5 --Q 2  **[MIDJOURNEY 5]**

# What is bokeh?

The **bokeh effect** is produced when the foreground and/or background is intentionally blurred around a subject. Bokeh, meaning "blur" in Japanese, can be achieved by using adjusting a camera's aperture for a *shallow* depth of field. The bokeh effect is an aesthetic choice and tends to give images a dreamlike appearance.

*https://www.studiobinder.com/blog/what-is-bokeh-effect/*
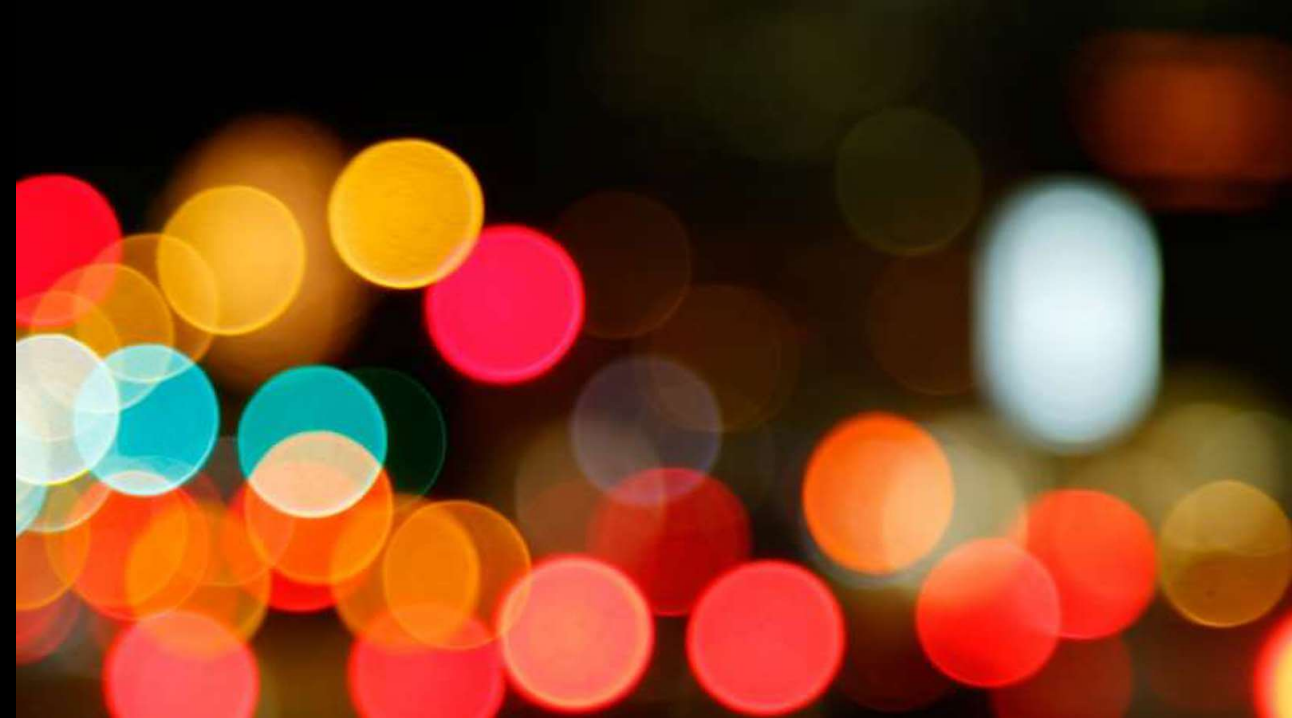
# BOKEH EFFECT, THE LAKHIYANA:

WOMAN WHO RESEMBLES DEEPIKA PADUKONE AND ANGELINA JOLIE PLAYING HOLOGRAM ROULETTE WITH DEV PATEL IN A FUTURISTIC TUXEDO, EXTRUDED 3D LIGHT GRAPHS, BURNING SANSKRIT HOLOGRAMS, **BOKEH**, RAYTRACING, DETAILED SKIN, DRAMATIC PERSPECTIVE, CHIAROSCURO, LOW-CONTRAST, **SHALLOW DOF** --AR 3:2 --V 5 --Q 2  **[MIDJOURNEY 5]**

# BOKEH EFFECT, THE LAKHIYANA:

A WOMAN WHO RESEMBLES DEEPIKA PADUKONE AND ANGELINA JOLIE DANCING IN A HALLUCINATORY VORTEX WITH DEV PATEL IN A FUTURISTIC TUXEDO, **BOKEH,** RAYTRACING, CGI, LUMEN REFLECTIONS, FILM PHOTOGRAPHY, DSLR, STUDIO QUALITY, CLOSE UP PORTRAIT PHOTO BY ANNIE LEIBOWITZ, CHIAROSCURO, LOW-CONTRAST, WORM'S EYE VIEW, **SHALLOW DOF** --V 5 --Q 2  **[MIDJOURNEY 5]**

A WOMAN WHO RESEMBLES DEEPIKA PADUKONE AND ANGELINA JOLIE DANCING IN A HALLUCINATORY VORTEX WITH DEV PATEL IN A FUTURISTIC TUXEDO, **BOKEH**, STUDIO LIGHTING, DETAILED SKIN, DRAMATIC PERSPECTIVE, LOW-CONTRAST, WORM'S EYE VIEW, **SHALLOW DOF** --AR 3:2 --V 5 --Q 2  **[MIDJOURNEY 5]**

# ISO

Perhaps the most difficult
manual setting to emulate,
ISO grain can be approximated
through thoughtful prompting,
blending, and post-processing.

## Aperture

small aperture → large aperture

| F22 | F16 | F11 | F8 | F5.6 | F4 | F2.8 | F2 | F1.4 |

## Shutter

fast shutter speed → slow shutter speed

| 1/1000 | 1/500 | 1/250 | 1/125 | 1/60 | 1/30 | 1/15 | 1/8 | 1/4 |

## ISO

low sensitivity → high sensitivity

| ISO 100 | ISO 200 | ISO 400 | ISO 800 | ISO 1600 | ISO 3200 | ISO 6400 | ISO 12800 | ISO 25600 |

# What is ISO?

**ISO** (International Organization for Standardizations) **is what measures your camera's sensitivity to light.** More specifically, how sensitive the digital sensor is to light, (it also measures the *film's* sensitivity, if using a traditional camera). **It is represented in numbers such as 50, 100, 200, 400, 800, 1600, 3200, etc**. When you change the ISO on a digital camera, you're rendering the sensor *more* or *less* sensitive to light. The lower the ISO number, the less sensitive the sensor is to light. High ISO numbers have high light sensitivity. So, when you change the ISO from 100 to 200, you are doubling the sensor's sensitivity.

In well-lit environments, a lower ISO (200 or below) should be used. When shooting in low-light situations, a higher ISO (400 or above) is best. **ISO 100 is considered standard.** Higher numbers are best for darker situations. **But keep in mind, higher ISO could cause grainy images, as you see in my image to the right, which is ISO 3200.** ISO is only one point on the exposure triangle, which also includes shutter speed and aperture. Using all three — ISO, aperture, and shutter speed, help to balance an image's grain and exposure. That said, while many modern cameras don't go beyond 6400, Canon just released an ISO 4 million camera, which means it can basically see in the dark.

*https://www.studiobinder.com/blog/what-is-iso/*



Fire Singers II • 78 x 52 • Uluwatu, Bali, Indonesia • 6.13.2013 • f/3.2 • 1/100 sec • **3200 ISO** • 135 mm • Canon EOS 5D Mark II • Jazno Francoeur

**Can you express ISO in AI-generated imagery through numerical manual setting prompts?** <span style="color:yellow">**No, but you can approximate film grain through descriptors and post-processing.**</span>

<span style="color:yellow">**The results for numerical settings are inconsistent, and therefore not reliable**</span>. **However, you can use <span style="color:yellow">descriptors</span> to approximate different ISO numbers.** In the tests to follow this slide, the other descriptors remain the same, except for the **ISO**, which is typically variable from 0 to 6400. Here ais the template prompt:

*Pass One: "ISO 30000, Dr. Strange hurling a magic spell made of circular holograms and glowing runic glyphs in a room of mirrors, 32k, caustics, tracers, multiple exposure, long exposure, style of Sargent, dramatic shadows and lighting, quantified photon capture, worm's eye view, forced perspective, time lapse, --ar 32:9 --q 2 --v 5.1*

**If ISO was accurately reflected by AI software, it would ideally look like the progression of images below,** where the images become more and more grainy the higher you push the ISO number. **However, this effect was augmented in Photoshop and is NOT accurate.**

**What ISO variances should look like:**



200 ISO

800 ISO

1600 ISO

3200 ISO

**Actual results, below.** I have taken the original image, which itself was prompted as "ISO 2000", and changed the descriptor to "30000". Most consumer cameras do not shoot beyond 6400 without pixelation. As you can see, **there is almost no difference in resolution.**



ISO 2000



ISO 30000

The next series of tests was time-intensive, as I found that the only reliable way to achieve the textures of film grain was to use **blend mode** with Seurat charcoal drawings (which one could substitute with other textured examples) and an AI image approximating ISO 1600.  **It is faster to use Photoshop or some other post-processing software to add noise/grain to approximate different ISO levels, though it is possible with blend mode workarounds.** Blend URL's highlighted in yellow:



**PROMPT:**
https://s.mj.run/tOgnP_eOJJM https://s.mj.run/3dDpySfFBIw https://s.mj.run/h9R9BQxpVVQ https://s.mj.run/smRe1eYPuuU
https://s.mj.run/rRdgONM8iE8 grainy color portrait of a tattoed Vogue Asian female model in a colorful circus, Seurat charcoal drawing textures, found footage, analog horror, visible noise and film grain, super 8 video grain, style of Sebastião Salgado and Shane Hurlbut, saturated color --ar 2:1 --v 5.2  **[Midjourney 5.2]**

# LOW ISO (CIRCA 100), FILM GRAIN TESTS:

CLOSE-UP OF A TATTOED VOGUE ASIAN FEMALE MODEL IN A COLORFUL CIRCUS, FOUND FOOTAGE, ANALOG HORROR, STYLE OF SEBASTIÃO SALGADO AND SHANE HURLBUT, SATURATED COLOR, CHIAROSCURO --AR 2:1 --V 5.2  [MIDJOURNEY 5.2]  *NOTE THAT BLEND MODE WAS NOT USED FOR THIS RENDER, AS IT HAS NO NOTICEABLE GRAIN

# MEDIUM ISO (CIRCA 1600), FILM GRAIN TESTS:

HTTPS://S.MJ.RUN/TOGNP_EOJJM HTTPS://S.MJ.RUN/3DDPYSFFBIW HTTPS://S.MJ.RUN/H9R9BQXPVVQ HTTPS://S.MJ.RUN/SMRE1EYPUUU HTTPS://S.MJ.RUN/RRDGONM8IE8 A TATTOOED VOGUE ASIAN MODEL IN A COLORFUL CIRCUS, FOUND FOOTAGE, ANALOG HORROR, STYLE OF SEBASTIÃO SALGADO AND SHANE HURLBUT, SATURATED COLOR --AR 2:1 --V 5.2 [MIDJOURNEY 5.2]

# HIGH ISO (CIRCA 3200), FILM GRAIN TESTS:

HTTPS://S.MJ.RUN/TOGNP_EOJJM HTTPS://S.MJ.RUN/3DDPYSFFBIW HTTPS://S.MJ.RUN/H9R9BQXPVVQ HTTPS://S.MJ.RUN/SMRE1EYPUUU HTTPS://S.MJ.RUN/RRDGONM8IE8 GRAINY CLOSE-UP COLOR PORTRAIT OF A TATTOOED VOGUE MODEL IN A DILAPIDATED LOCAL BAR, SEURAT CHARCOAL DRAWING TEXTURES, FOUND FOOTAGE, ANALOG HORROR, VISIBLE NOISE AND FILM GRAIN, SUPER 8 VIDEO GRAIN, STYLE OF SEBASTIÃO SALGADO AND SHANE HURLBUT, SATURATED COLOR --AR 2:1 --V 5.2 [MIDJOURNEY 5]

# EXTREMELY HIGH ISO (CIRCA 12800), FILM GRAIN TESTS:

HTTPS://S.MJ.RUN/TOGNP_EOJJM HTTPS://S.MJ.RUN/3DDPYSFFBIW HTTPS://S.MJ.RUN/H9R9BQXPVVQ HTTPS://S.MJ.RUN/SMRE1EYPUUU HTTPS://S.MJ.RUN/RRDGONM8IE8 GRAINY COLOR PORTRAIT OF A TATTOOED VOGUE ASIAN FEMALE MODEL IN A COLORFUL CIRCUS, SEURAT CHARCOAL DRAWING TEXTURES, FOUND FOOTAGE, ANALOG HORROR, VISIBLE NOISE AND FILM GRAIN, SUPER 8 VIDEO GRAIN, STYLE OF SEBASTIÃO SALGADO AND SHANE HURLBUT, SATURATED COLOR --AR 2:1 --V 5.2 [MIDJOURNEY 5]

# POST-PROCESSING WITH PHOTOSHOP

**GRAINY** SUPER SATURATED COLOR PORTRAIT OF A LAUGHING FEMALE MODEL IN A COLORFUL CIRCUS, **SEURAT CHARCOAL DRAWING TEXTURES**, FOUND FOOTAGE, ANALOG HORROR, **VISIBLE NOISE AND FILM GRAIN, SUPER 8 VIDEO GRAIN,** STYLE OF SEBASTIÃO SALGADO AND SHANE HURLBUT --AR 2:1 **[MIDJOURNEY 5]**



This image was created with prompting only and no blend tool.

Using the film grain filter in Photoshop, you can easily add varying levels of grain to any image.

# ACKNOWLEDGMENTS:

The next lecture in this series is **Camera Basics for for Generative Art II**, where we will cover shots, angles, and aspect ratios.

# Camera Basics for Generative Art II

An introduction to camera shots, camera angles, and aspect ratios.