Intro to Photography

Ross den Otter

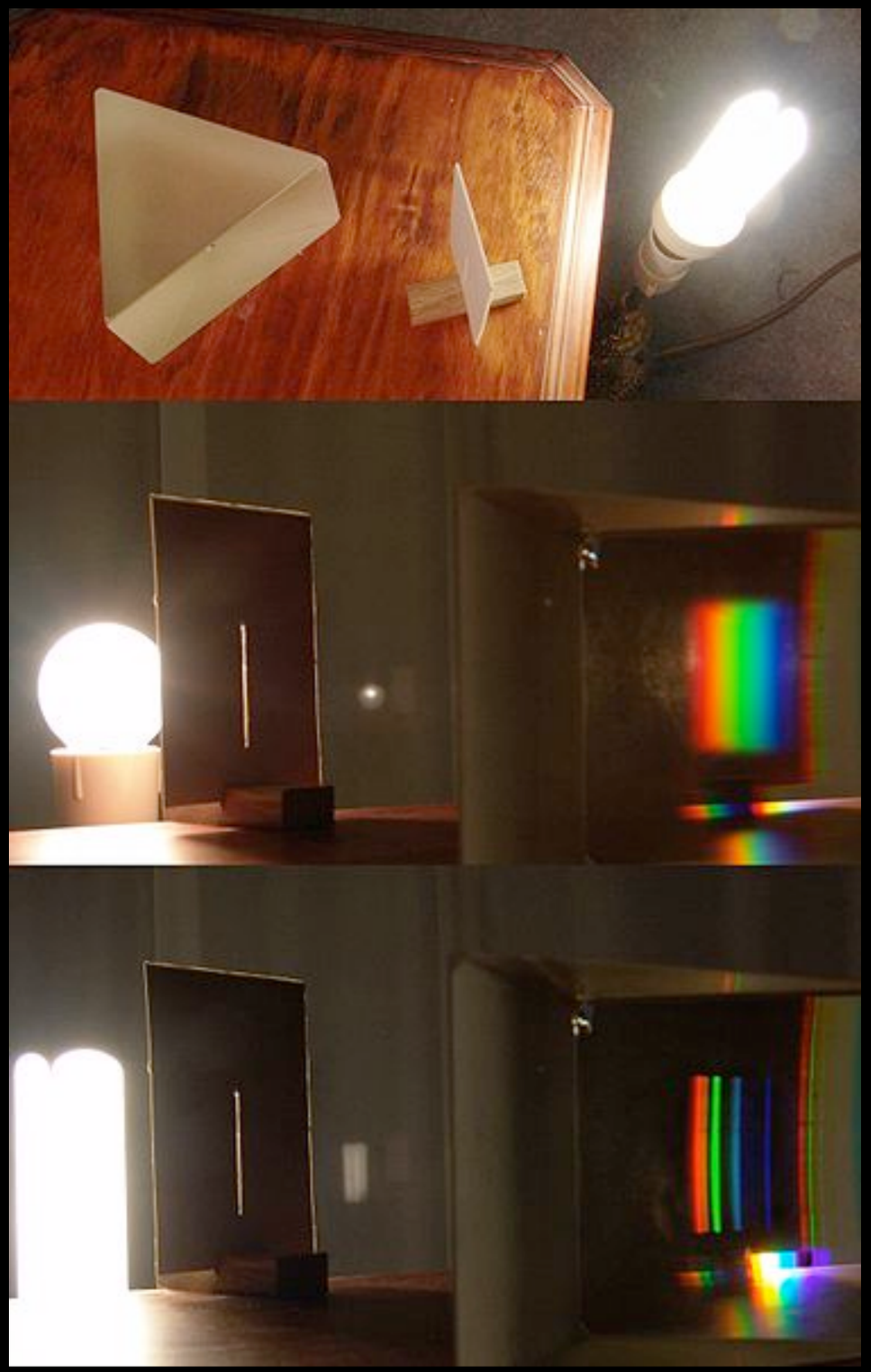
Session 8

Looking at light

Photography
starts with
light.

Colour
Quantity
Quality
Direction

Colour




~2700 K
60 W Incandescent
3500 K
13 W Fluorescent
5500 K
13 W Fluorescent

Daylight

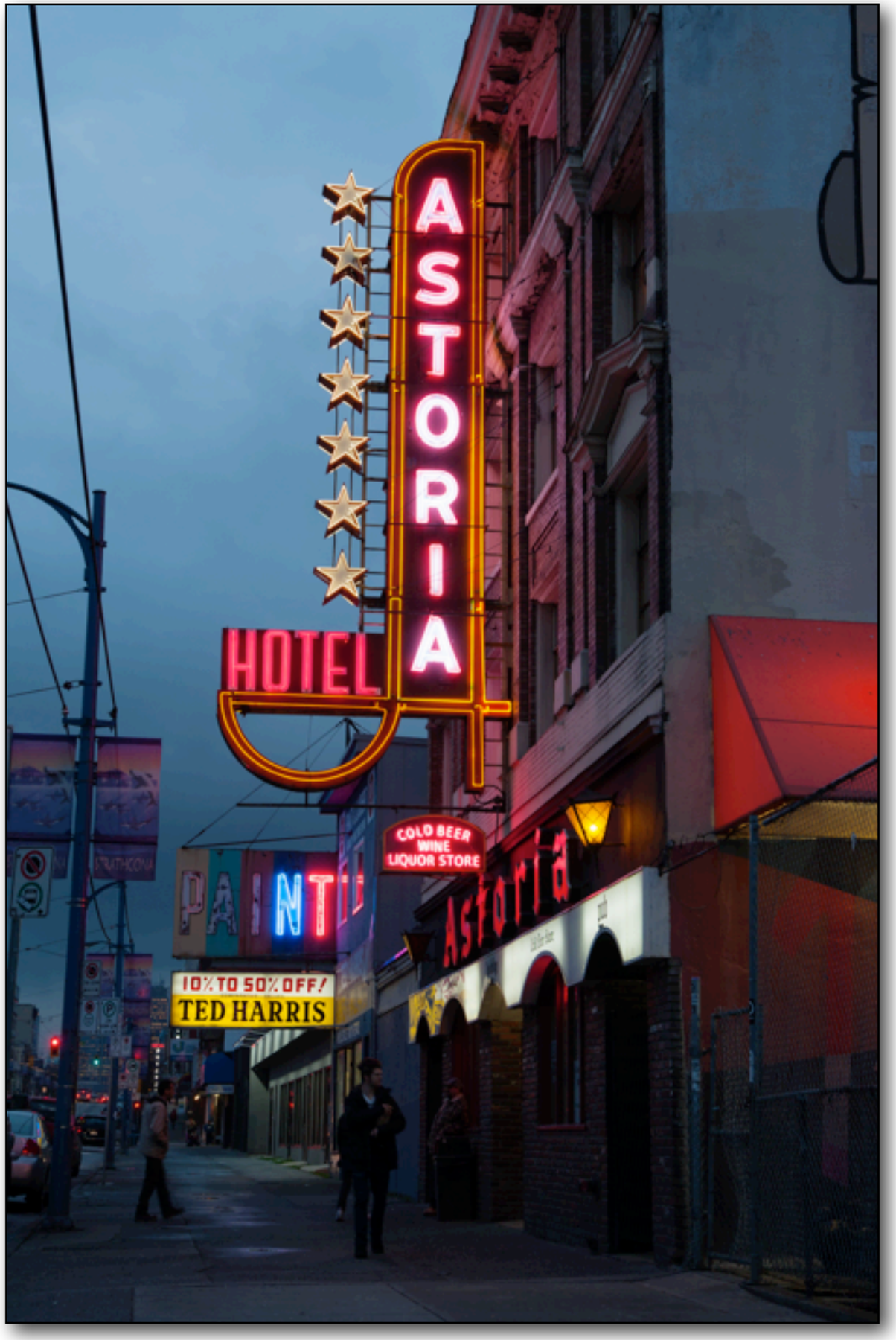
Tungsten

Cloudy

Auto

Quantity

ISO - Noise



200 ISO

ISO - Noise

12800 ISO

The Reciprocity Law

The **reciprocity law** states that the film or sensor response will be determined by the total exposure, defined as intensity × time. Therefore, the same response (for example, the optical density of the developed film) can result from reducing duration and increasing light intensity, and vice versa.

- 1/125 at f16
- 1/250 at f11
- 1/60 at f22
- 1/30 at f32
- 1/1000 at f5.6

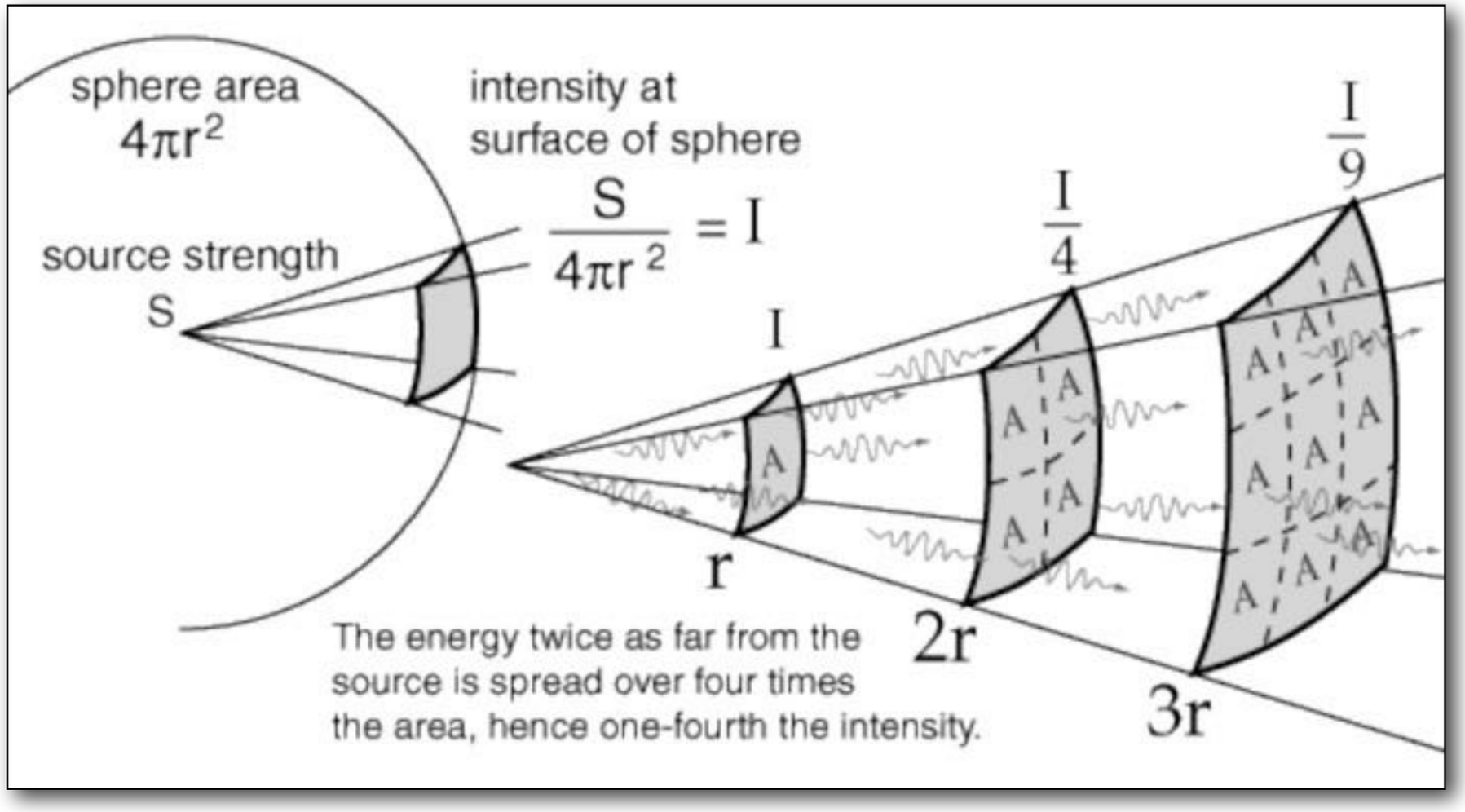
Each of these combinations would allow the same total exposure to register on the sensor.

Exposure is a little bit like filling a bucket of water, if you have a large hose it takes less time to fill the bucket.

Exposure is controlled by two variables:

1. The duration of the exposure; controlled by the shutter speed of the camera.

2. The quantity of light; controlled by the aperture on the lens.

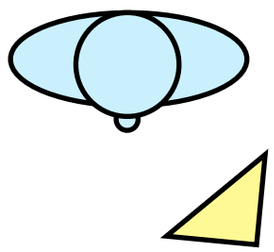


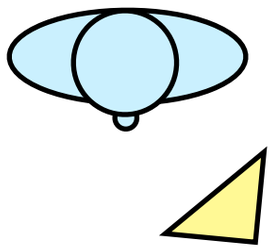
Inverse Square Law

In photography the inverse-square law is used to determine the "fall off" or the difference in illumination as you move the light source closer to or further from your subject. For quick estimates remember that doubling the distance reduces the illumination level to one quarter. The true observation of this law applies only to point source lights. When the light source is not a point source, the inverse square law can be used as an approximation.

Subject 1.9m from a white wall.
Light .8m from subject.

Subject 3.8m from a white wall.
Light .8m from subject.



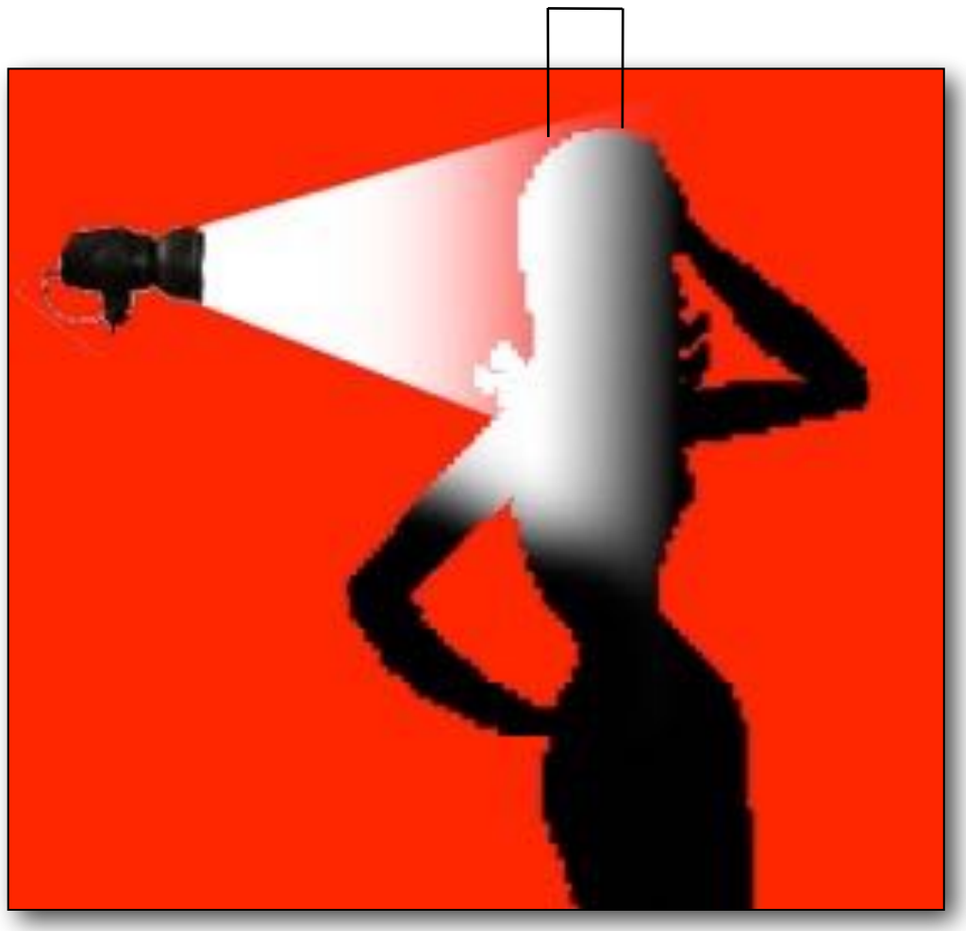


Quality

Highlight to shadow transfer

Specular vs Diffused?

Shadow
Transfer

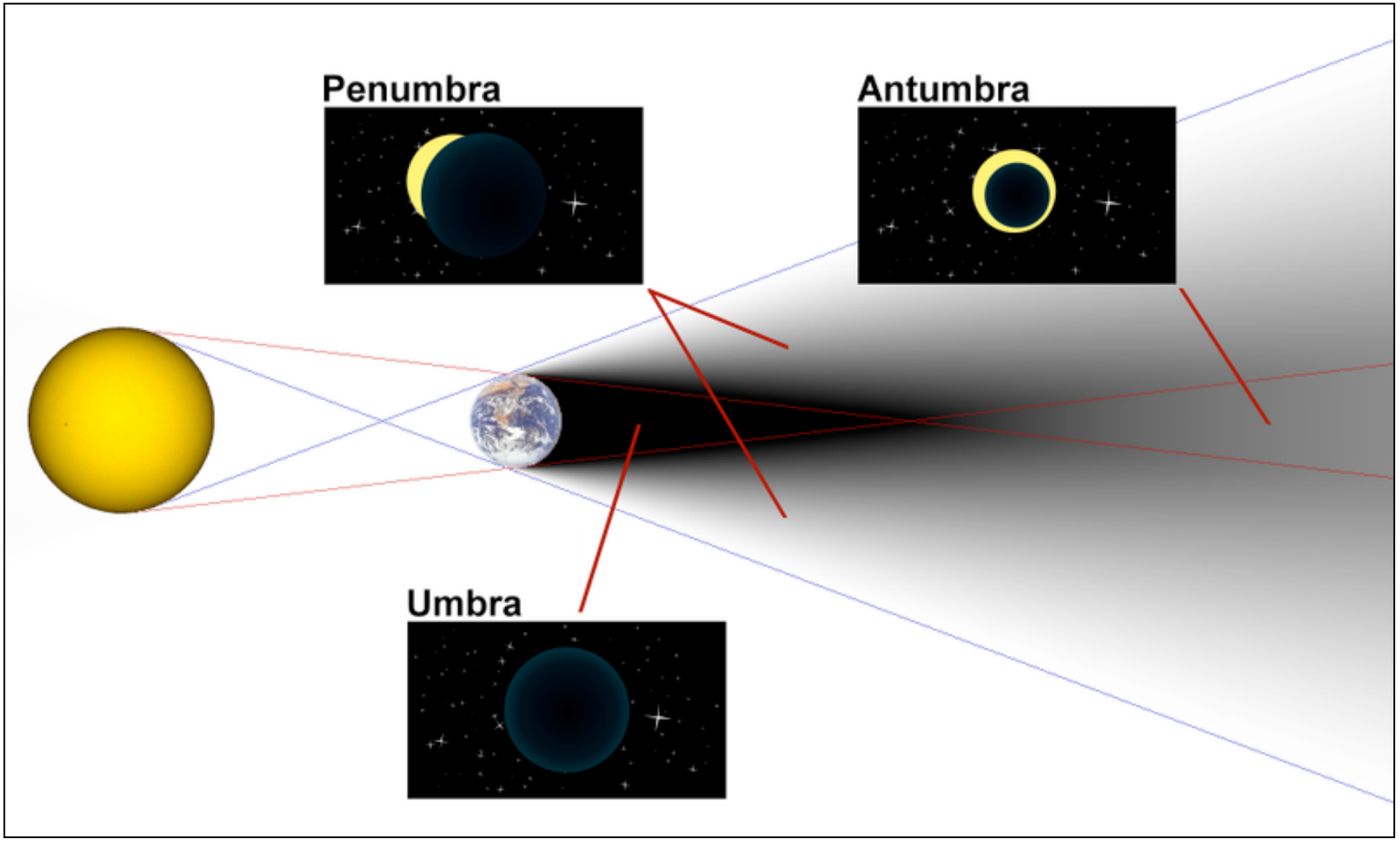


small light source

Shadow
Transfer

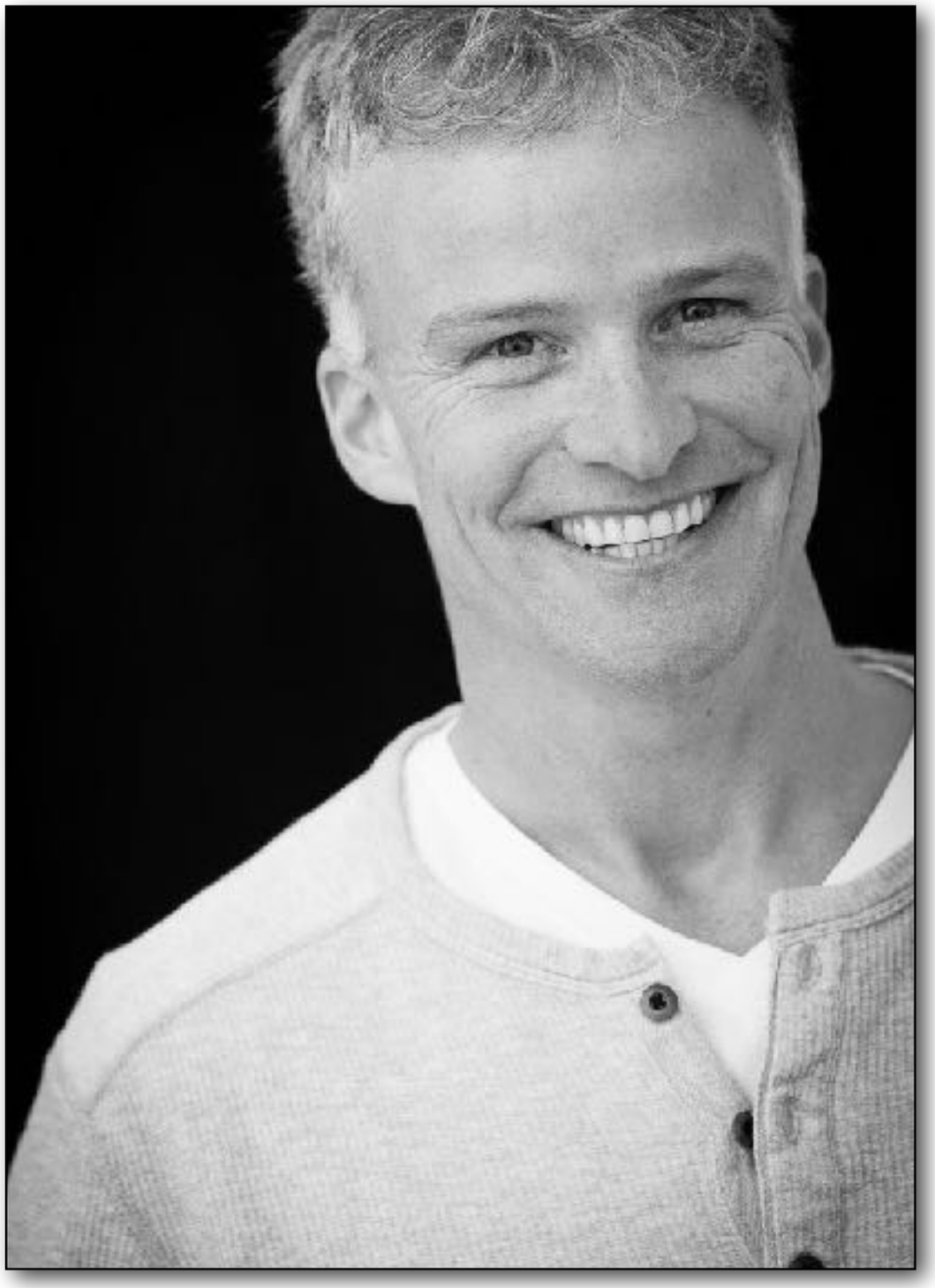
large light source

The parts of a shadow

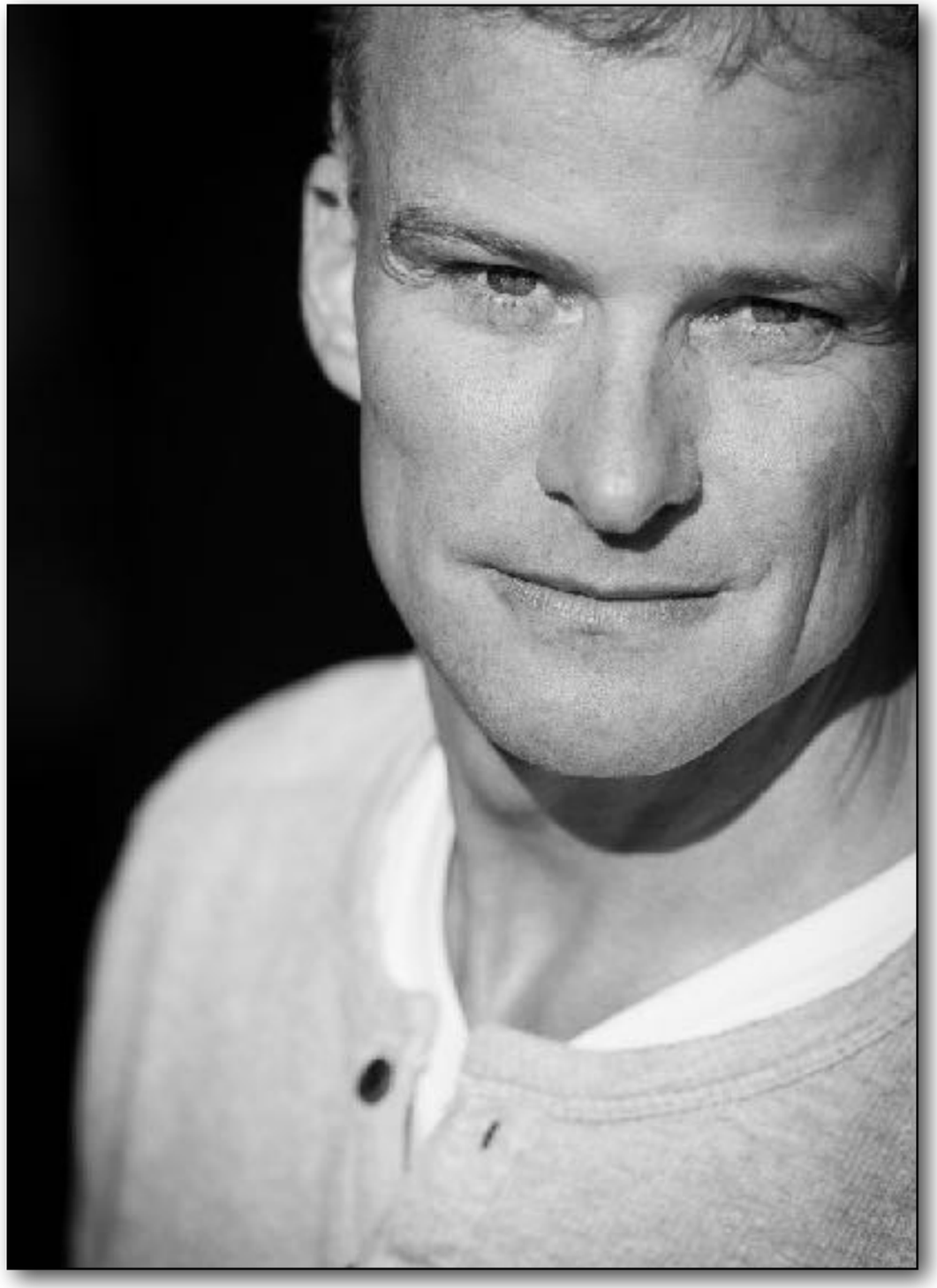


The umbra, penumbra and antumbra are the names given to three distinct parts of a shadow, created by any light source. Point sources of lights cast only the umbra, as the lights source gets larger the diffuse parts; the penumbra and antumbra are formed.

Large and small light sources



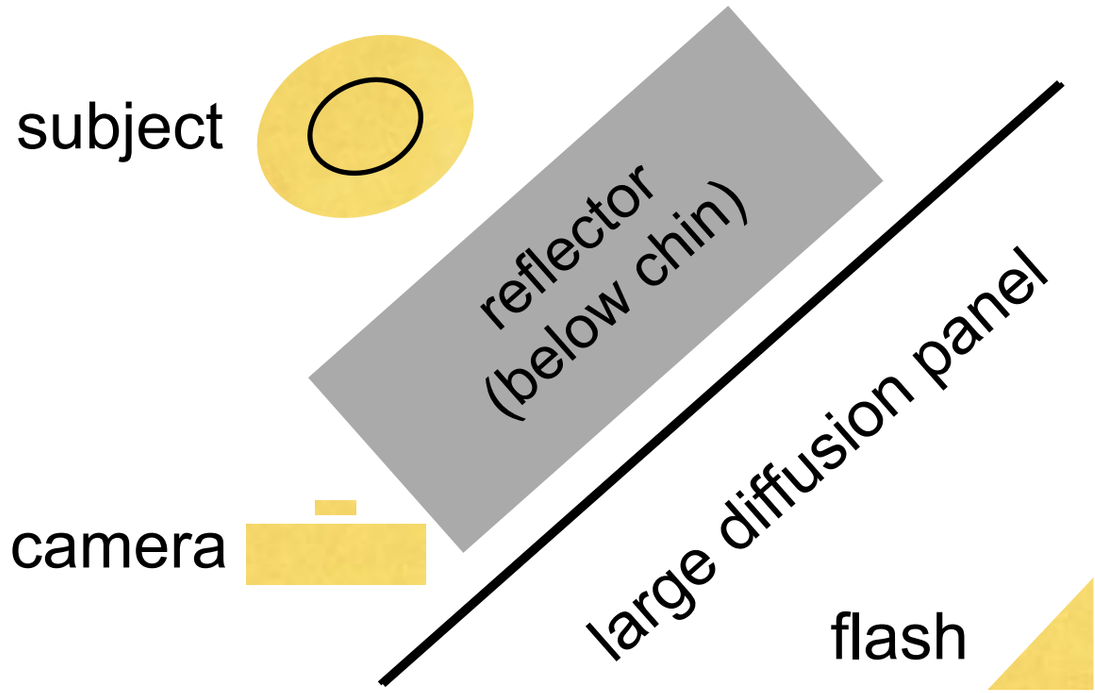
Shade



Direct sun

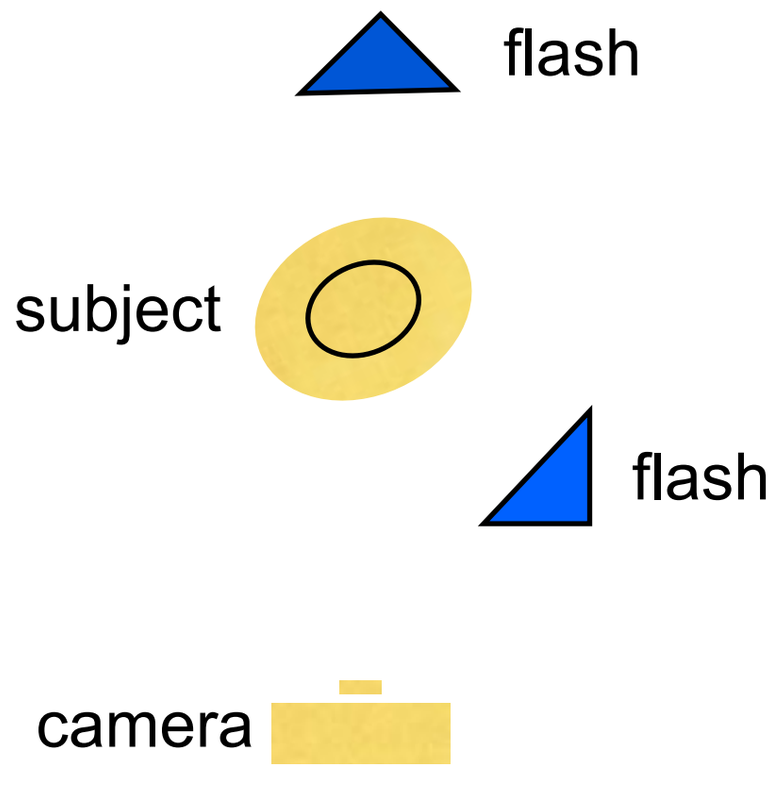
Large lights and the face

For a large light source to act as one, it needs to be close to your subject. As it's moved further from your subject it behaves more like a small source of light.



Small lights and the face

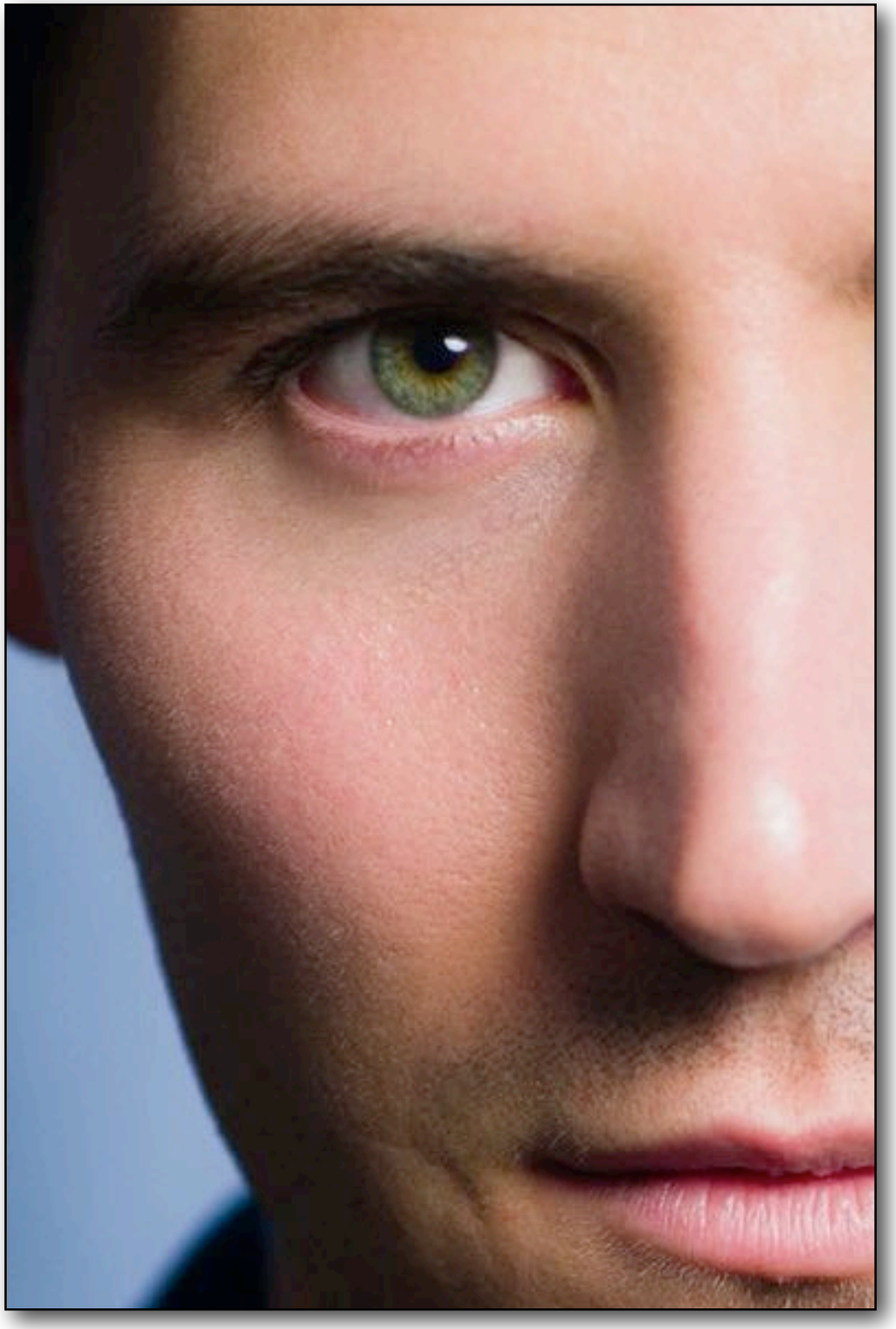
A small light source throws a more defined shadow and more specular highlights



The size and quality of light reveals different surface characteristics. Shadows reveal clues to the surface.

Point source light.

Small and diffused source light.



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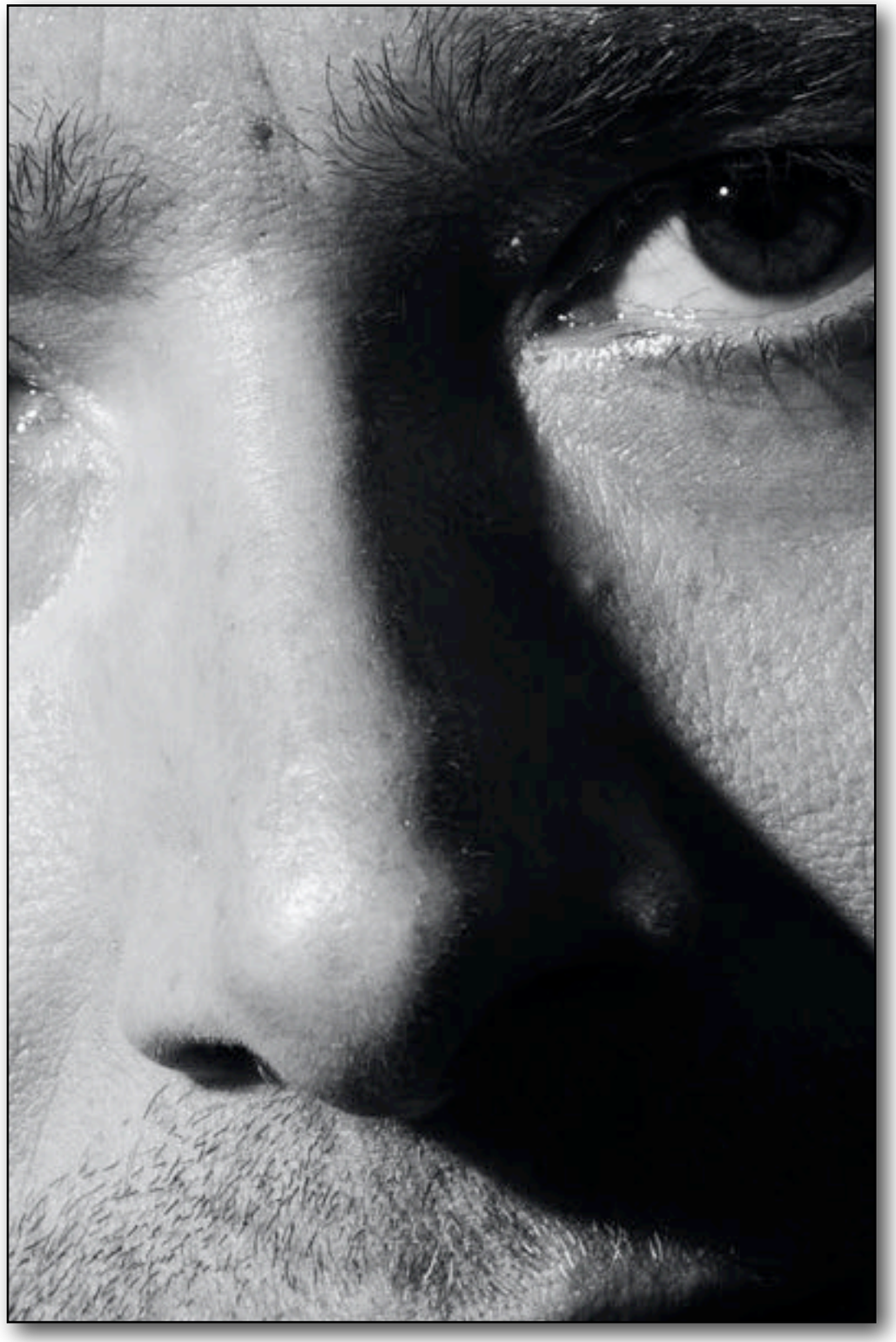
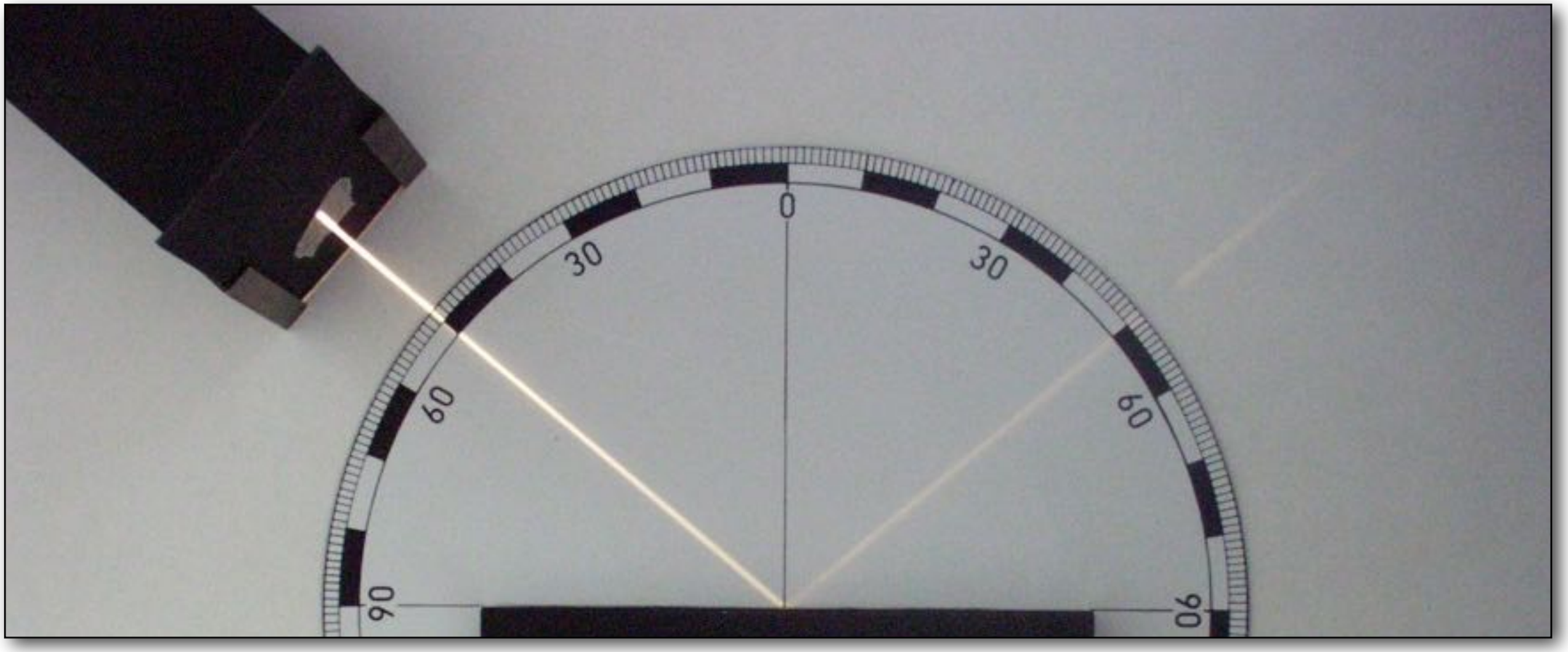


The size and quality of light reveals different surface characteristics. Shadows reveal clues to the surface.

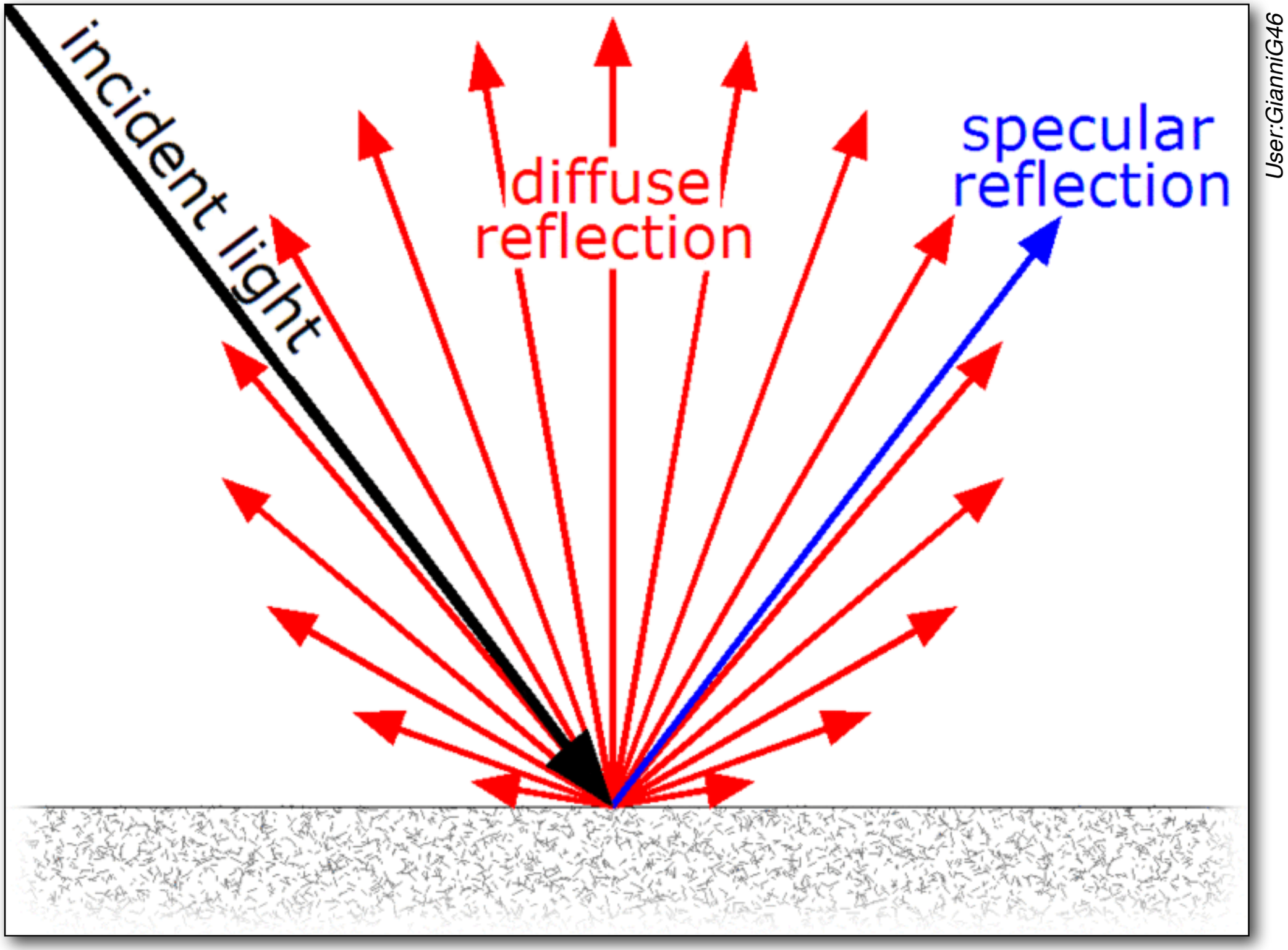
Direction



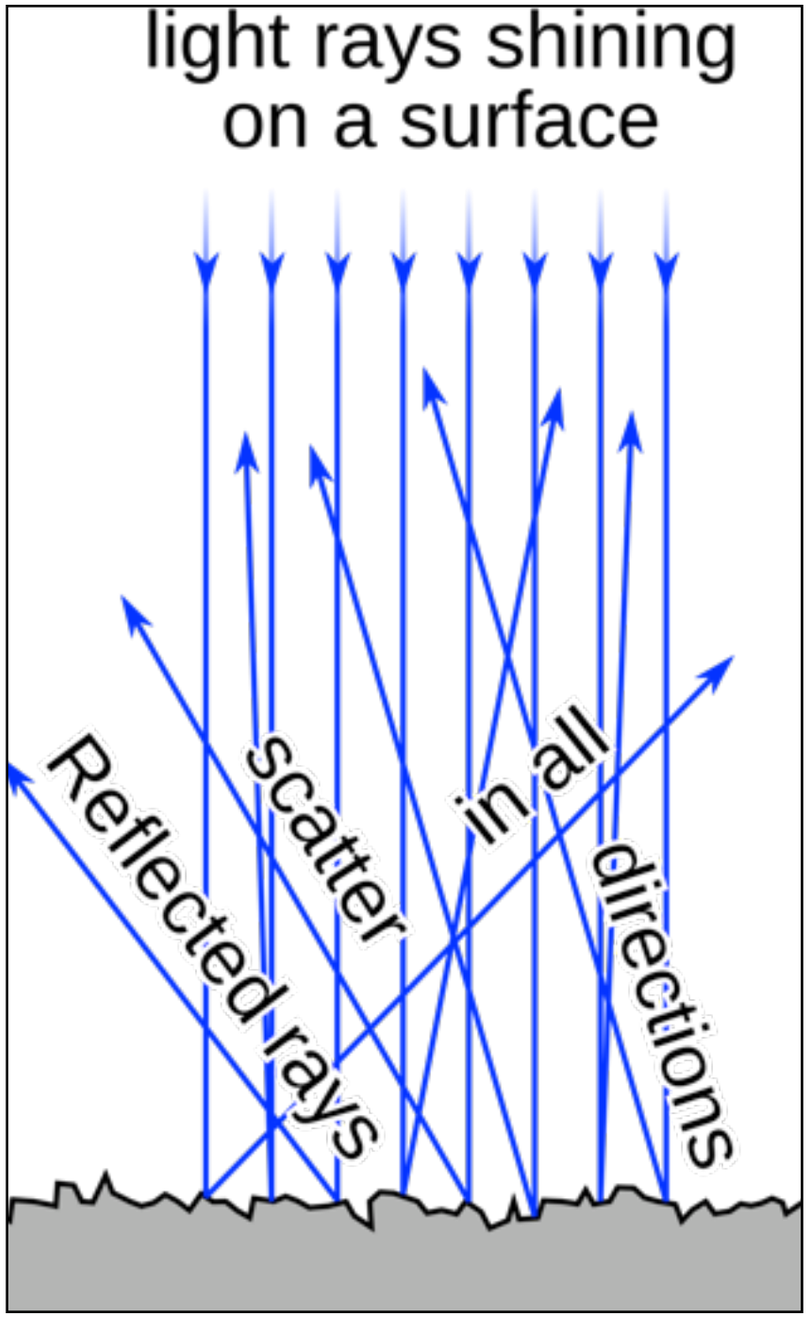
Law of reflection

A fairly straightforward law that states light will be reflected from a surface at an angle equal to its angle of incidence. Plain english: light reflects off an object in the opposite angle.

Glossy surfaces can create both specular and diffuse reflections.

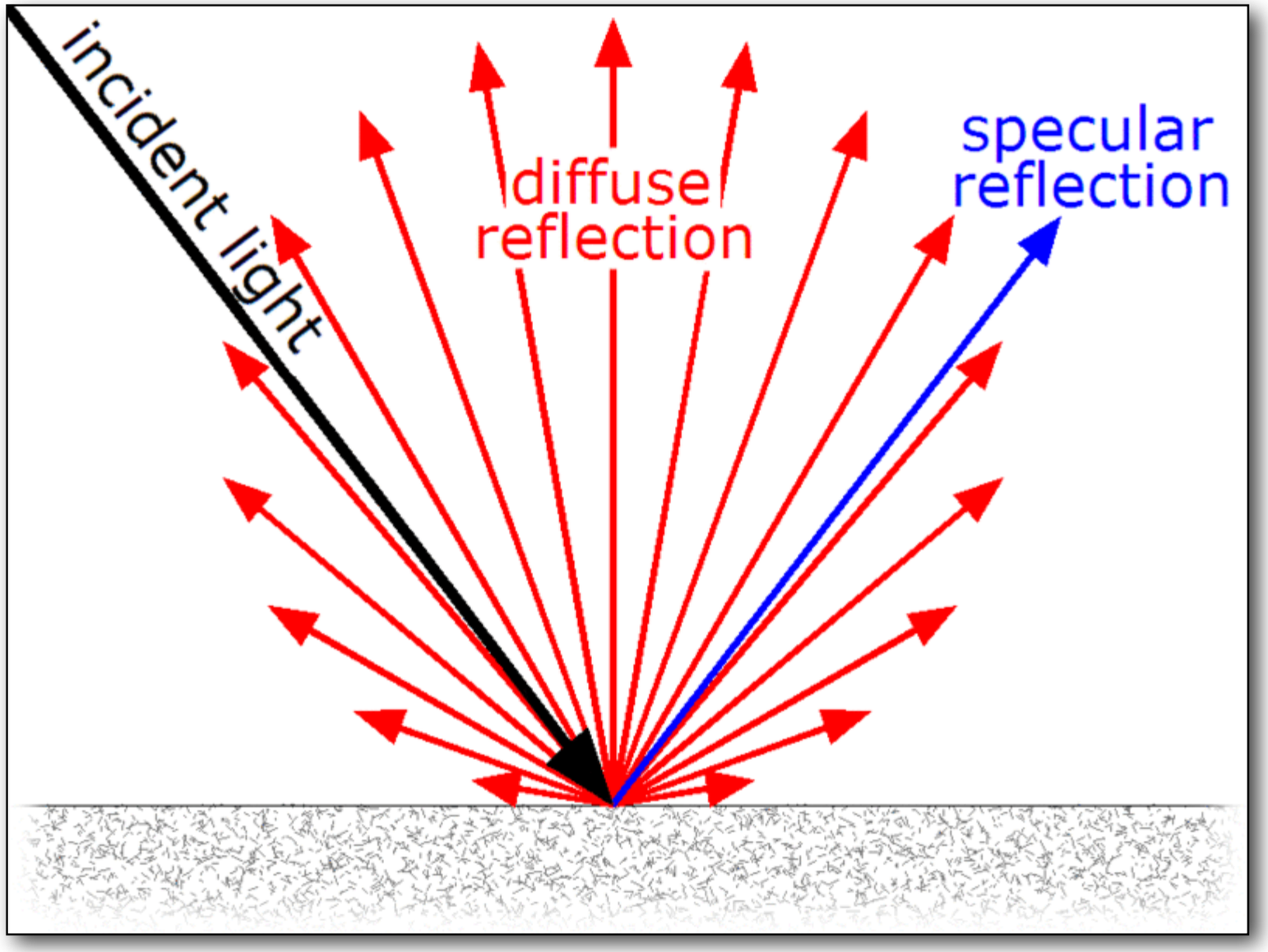


A diffuse highlight occurs when light is scattered at a range of angles.



Theresa knott at the English language Wikipedia

Light reflecting from an uneven surface



User:GianniG46

Light reflecting from a smooth surface

with polarizing filter

without polarizing filter

Specular and diffuse reflections

photo:Sarolta Dobi

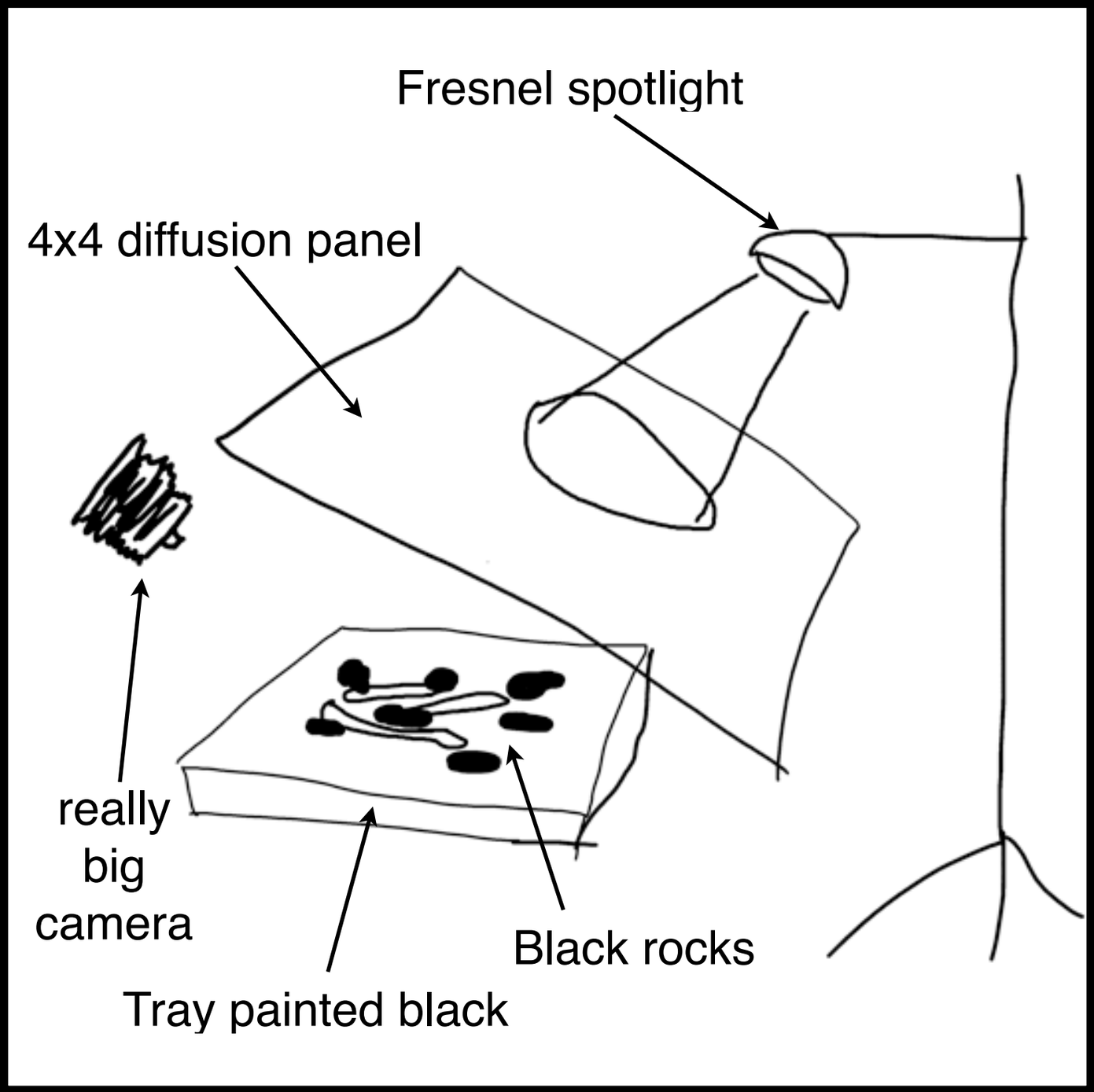
It contains examples of diffuse and specular highlights.

When lighting metal, the light is placed on the opposite angle the camera makes to the object being photographed, because angle of incidence equals angle of reflection. The trick is to use a large light source that reflects across the surface of the object and the art is managing the size of the diffused area so the specular highlights transition smoothly to darker tones. It's the difference between the objects looking like metal or like white plastic. This photo was made on an 8x10 camera using a 64 ISO tungsten balanced transparency film. The exposure was 45 seconds at f64.

photo:Sarolta Dobi

This image is backlit with a large light source, in this case a big diffusion panel at an angle opposite the camera.

photo:Sarolta Dobi



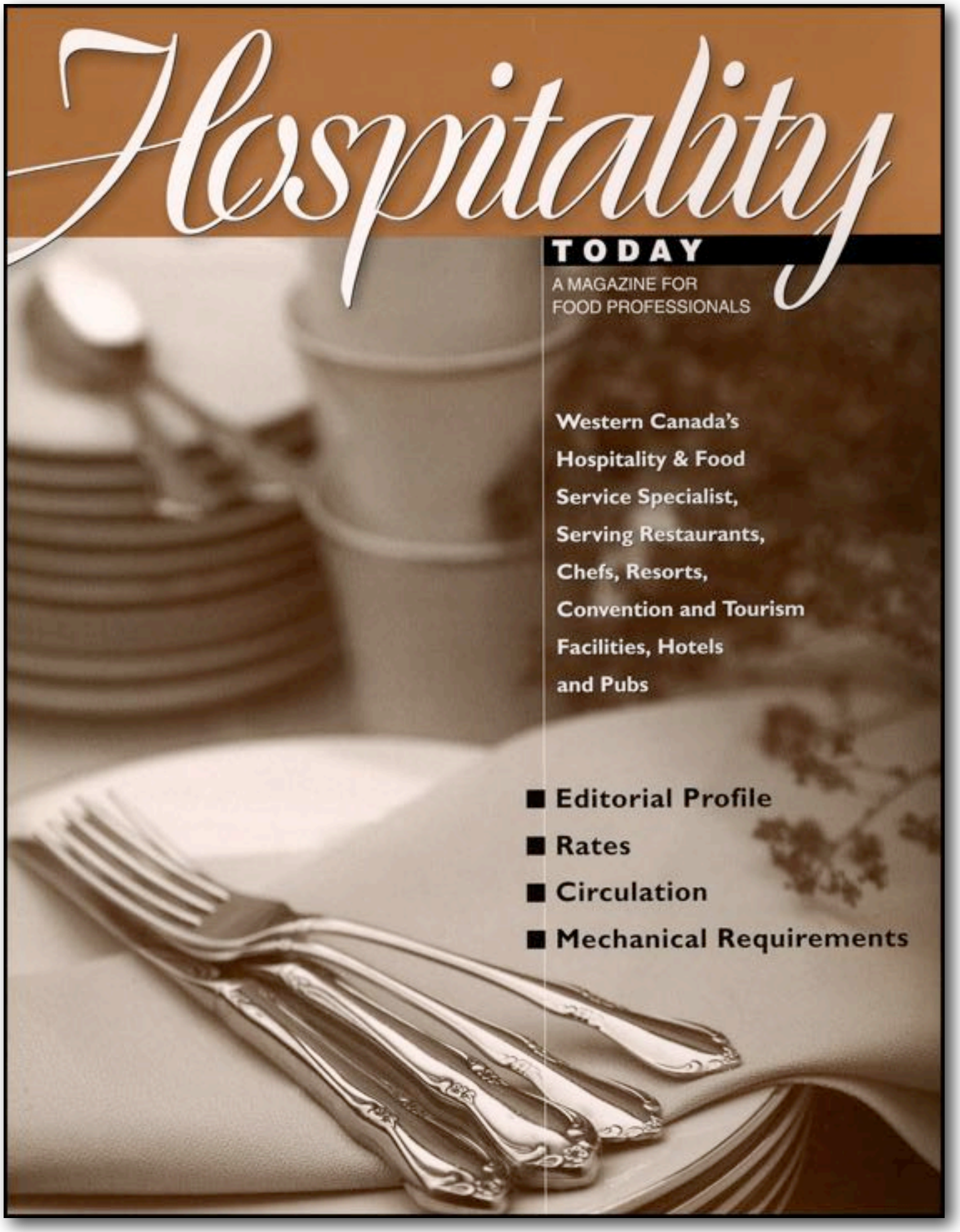
specular highlights

tonal gradation in specular highlights

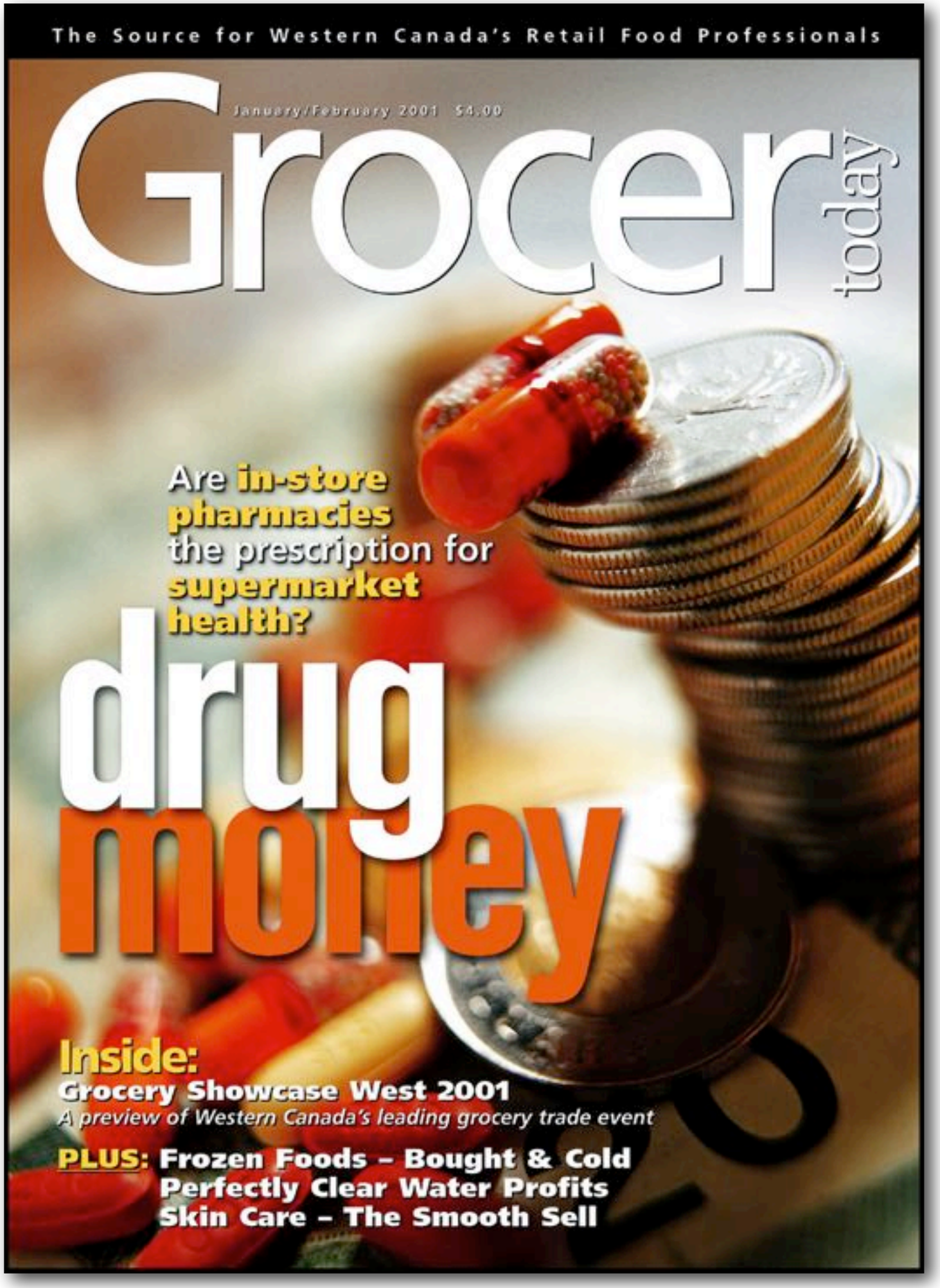
diffuse highlight transitions

specular or diffuse highlight?

photo:Sarolta Dobi



back lighting



back lighting

back lighting

side lighting

Using a fast shutter speed during the exposure the individual water droplets are frozen as they fall. Backlighting shows the translucency of the water.
Image made with a Nikon F90x with a 35-70 f2.8 lens at 60mm. The film was Fuji Neopan 1600 film and exposed at 1/2000 at f11

A front lit image of Venetian finery during Carnivale.

An example of side lighting...
...and why you shouldn't feed the pigeons.

Soft Boxes

Umbrellas

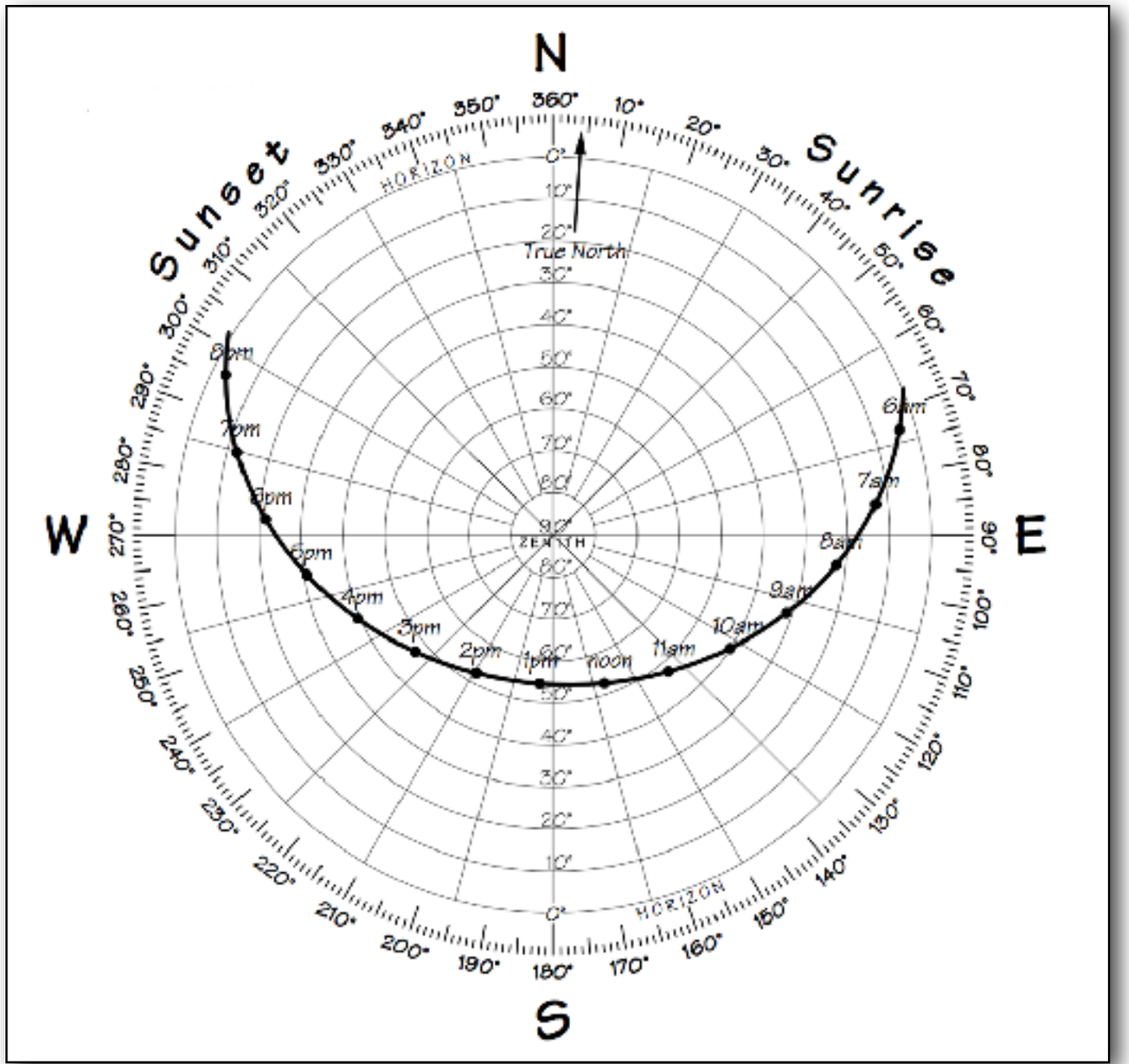
Beauty Dish

Natural Large Light Sources.

Photographically we consider 4 characteristics of light and the effect they have that have on the formation of an image. Here they are in no particular order.

- Colour
- Quantity
- Quality
- Direction

Why is north light so special?



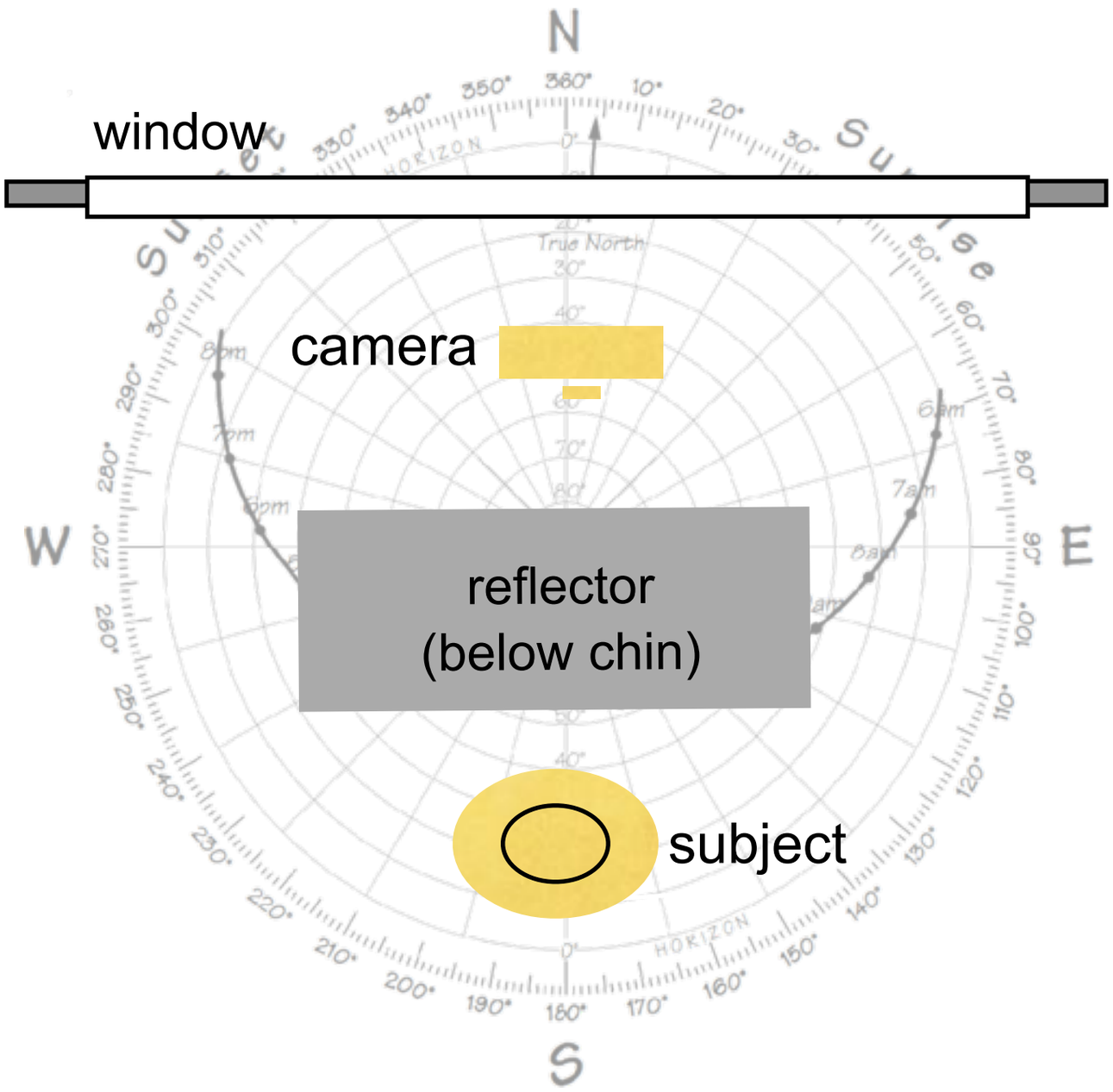
London, England. Latitude 51° 30' North, longitude 0° -6' East Wed 1/5/13

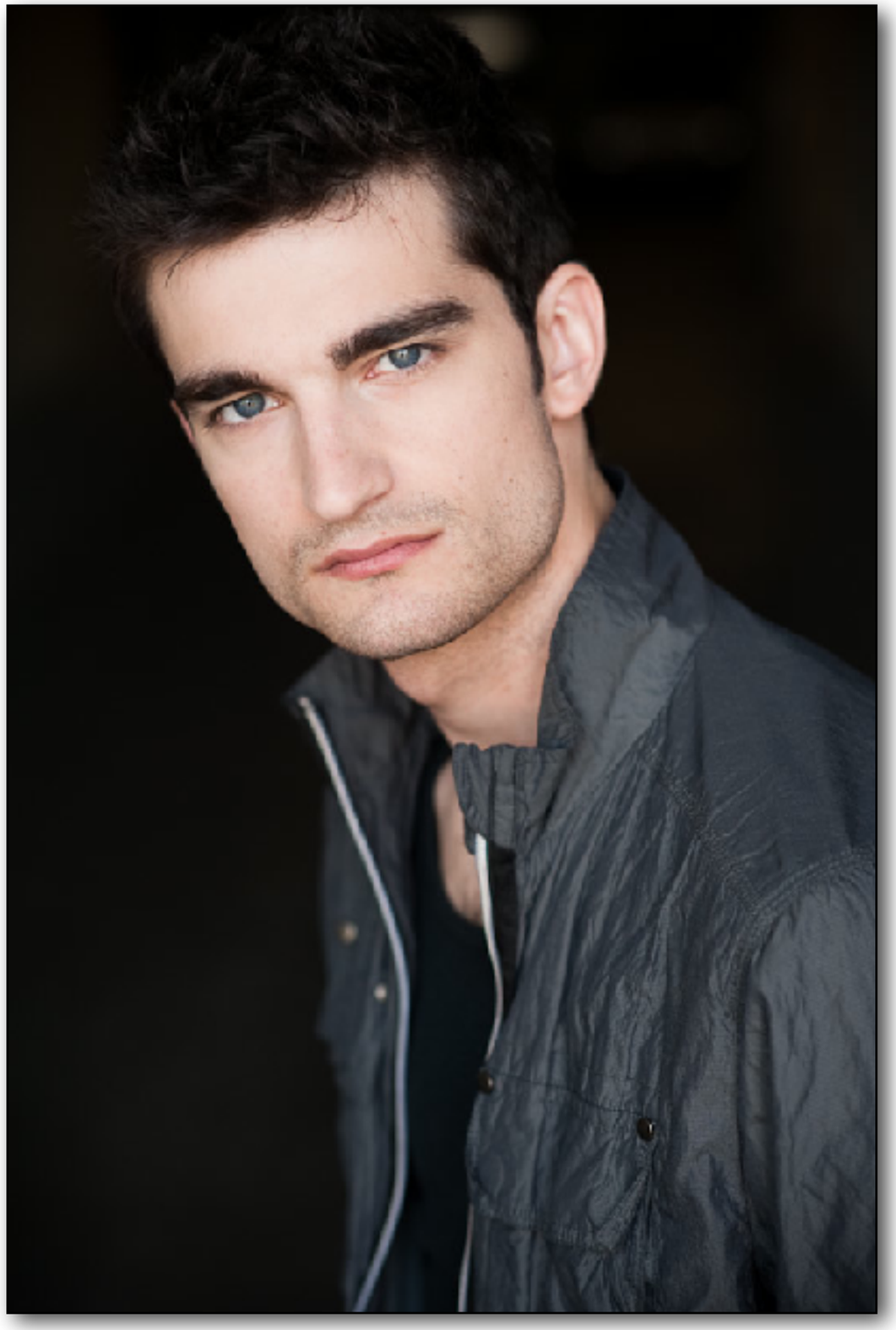
Generally, the sun moves from east to west as it passes through the sky. The light coming from the north is quite blue on a clear day. On cloudy days the light is a little more yellow.

Because the sun moves predictably through the sky, the quality of light coming through a north window remains relatively consistent.

Natural Light Sources.

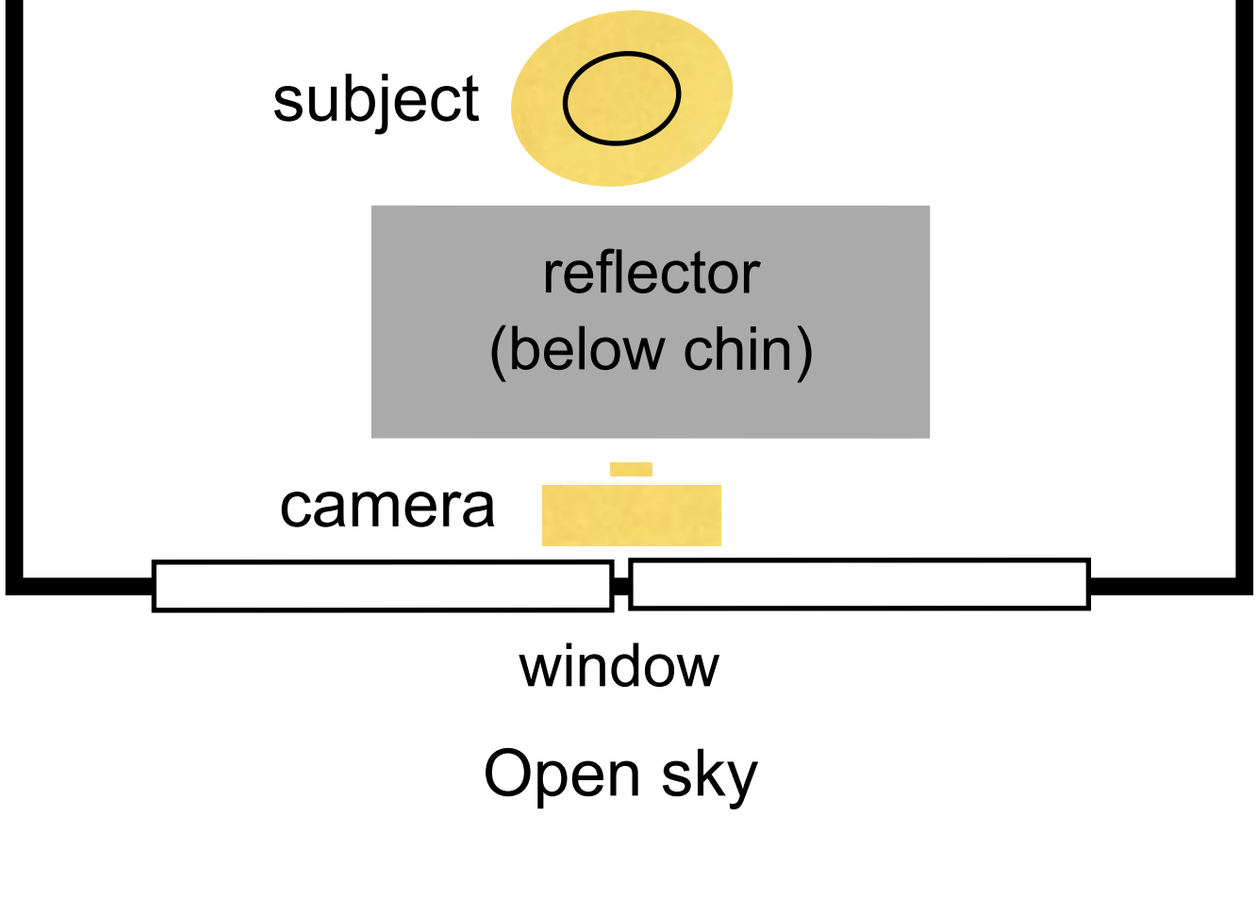
North light is the most consistent light for portraiture because its quality and direction remains constant through the day.





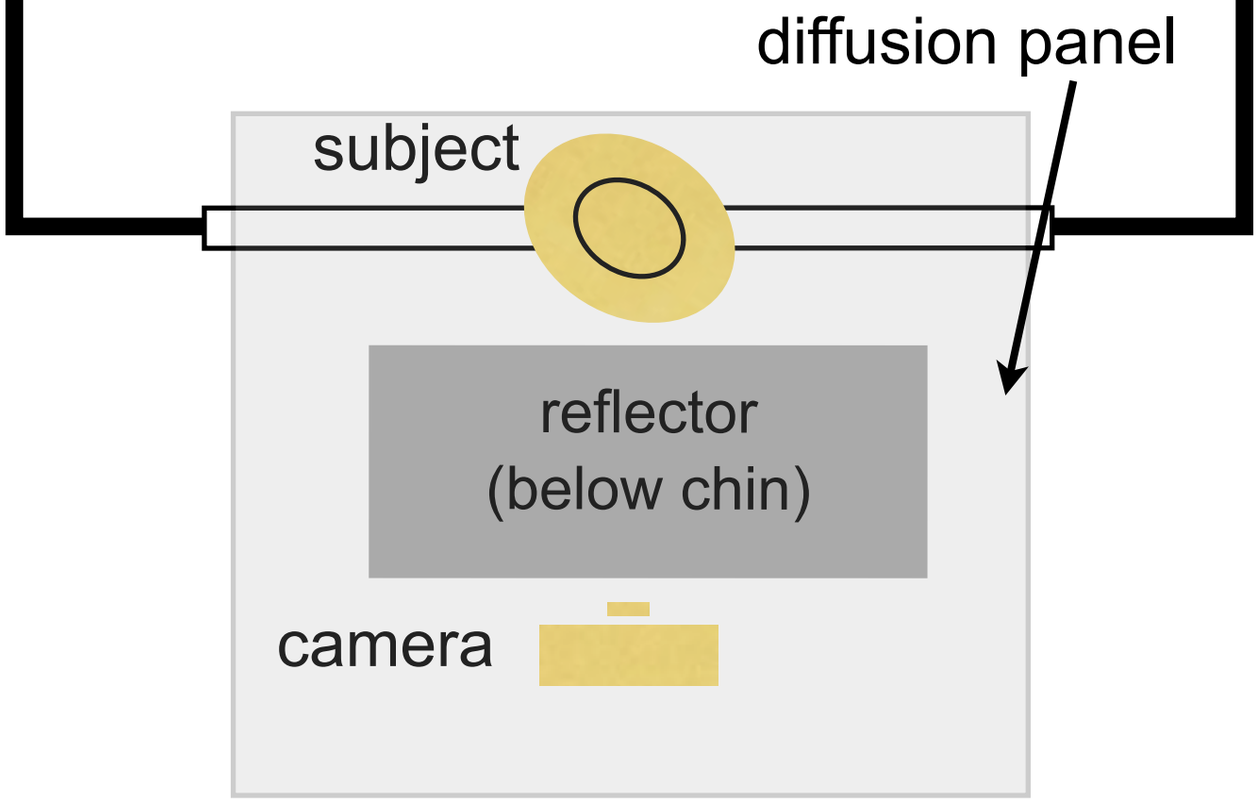
Nature’s Large Light Sources

The light coming through a set of double doors provides broad butterfly patterned source. The silver reflector give a specular catchlight to the eye.



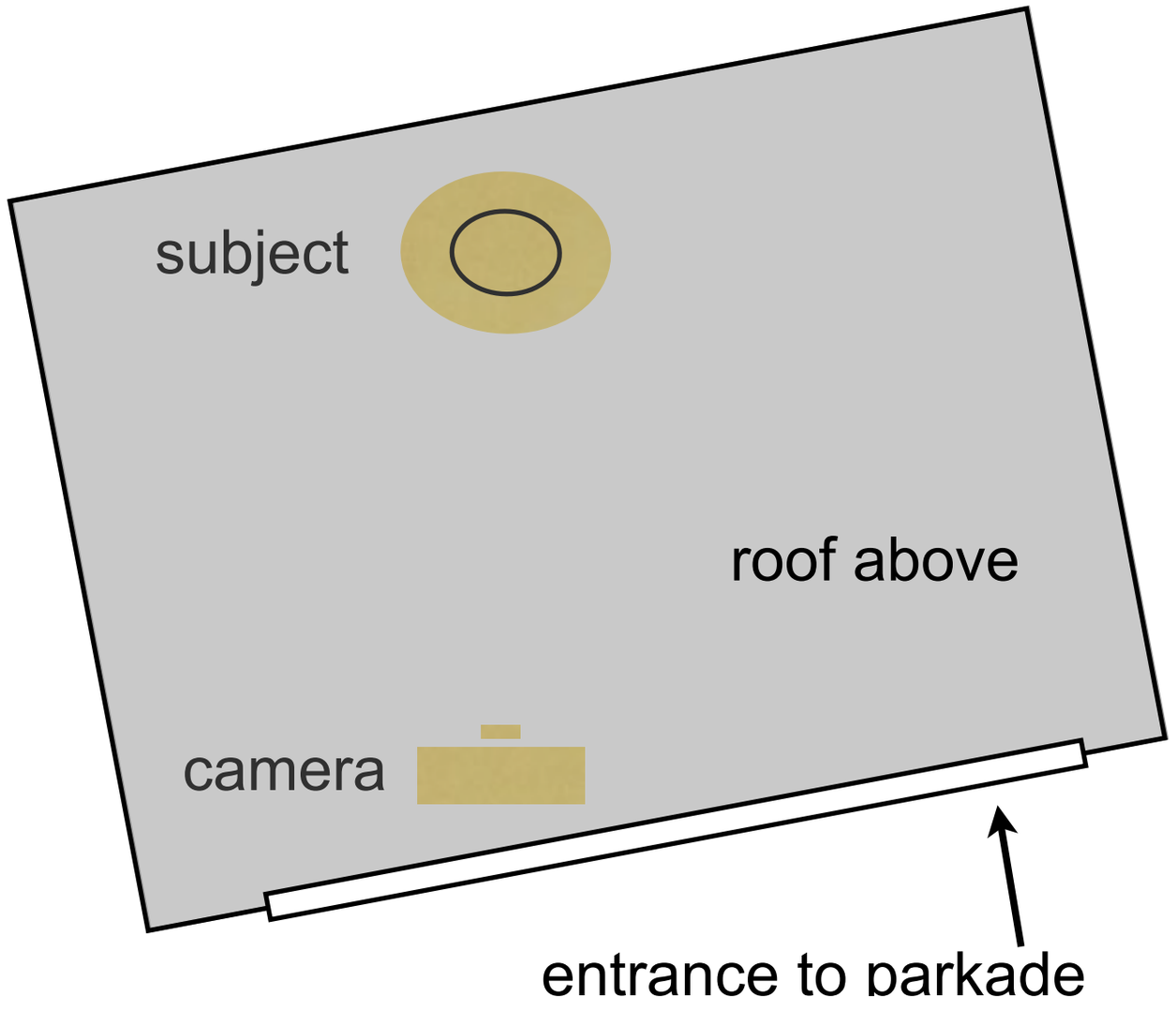
Nature’s Large Light Sources

The subject was standing in the opening of double doors. A reflector was placed below her chin and a diffusion panel was suspended above the subject and draped behind the camera.



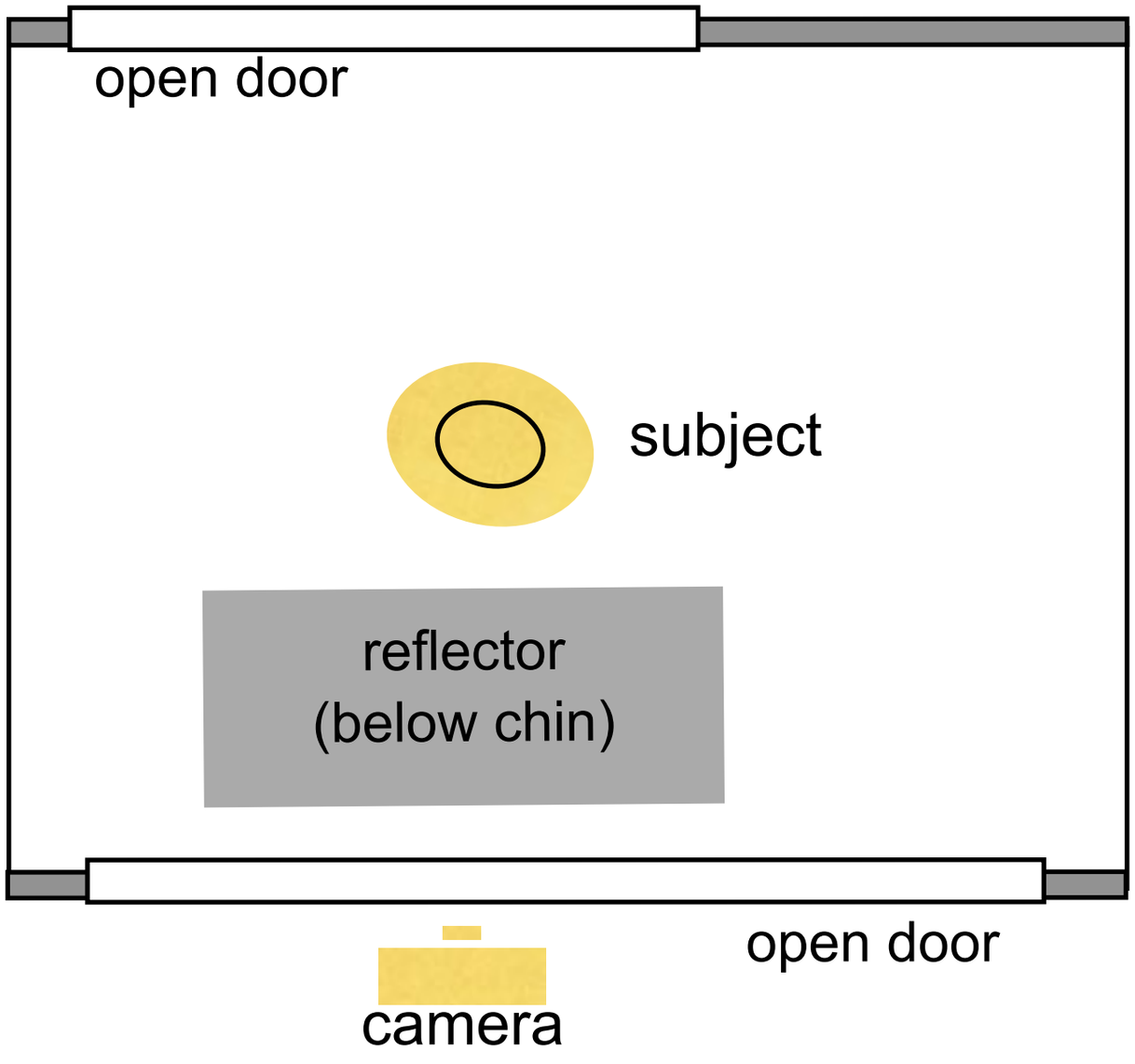
Nature’s Large Light Sources

North light, given directionality by the door opening, provides the key light for this portrait. The roof structure creates a columnated light source.



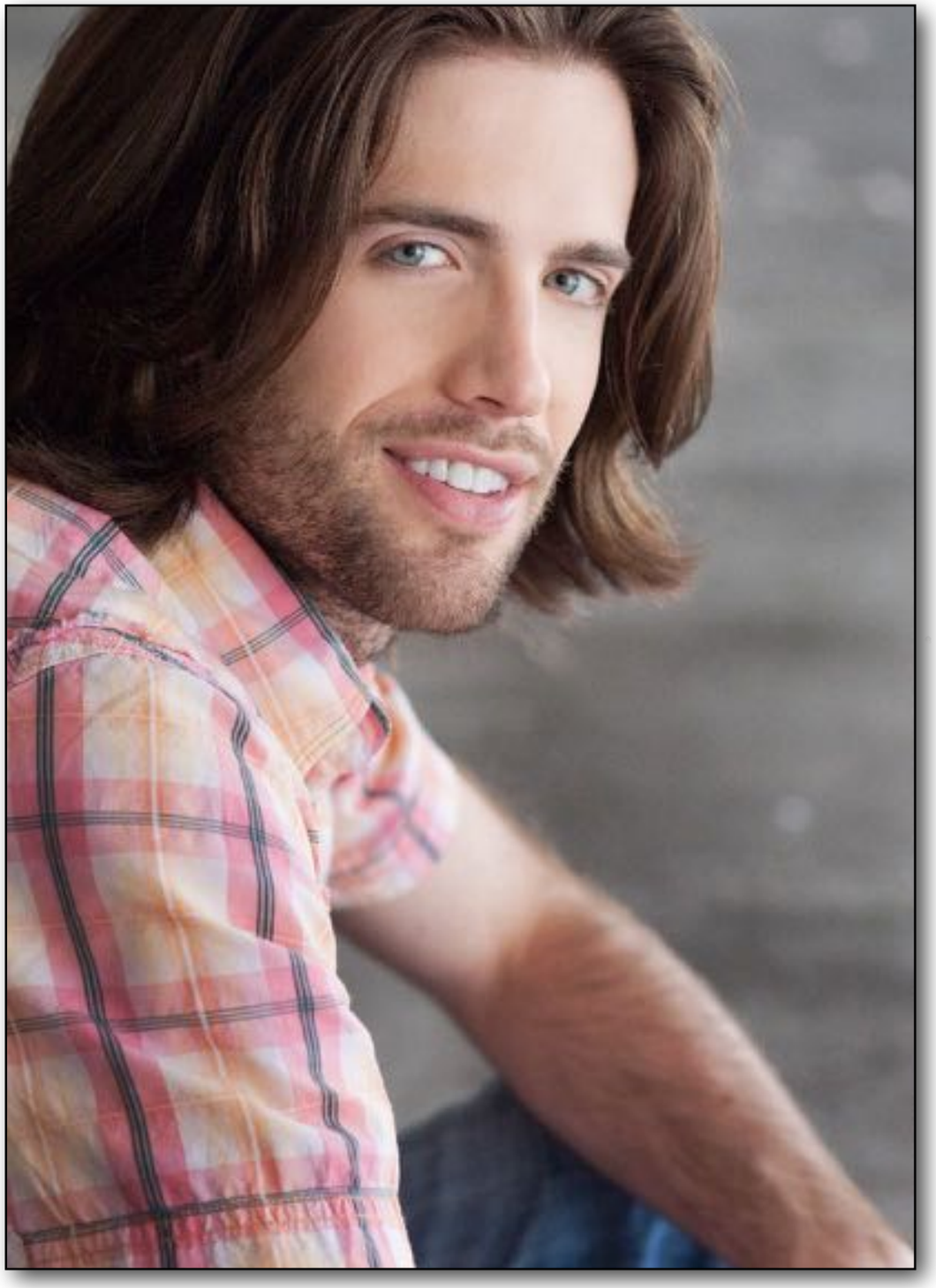
Nature’s Large Light Sources

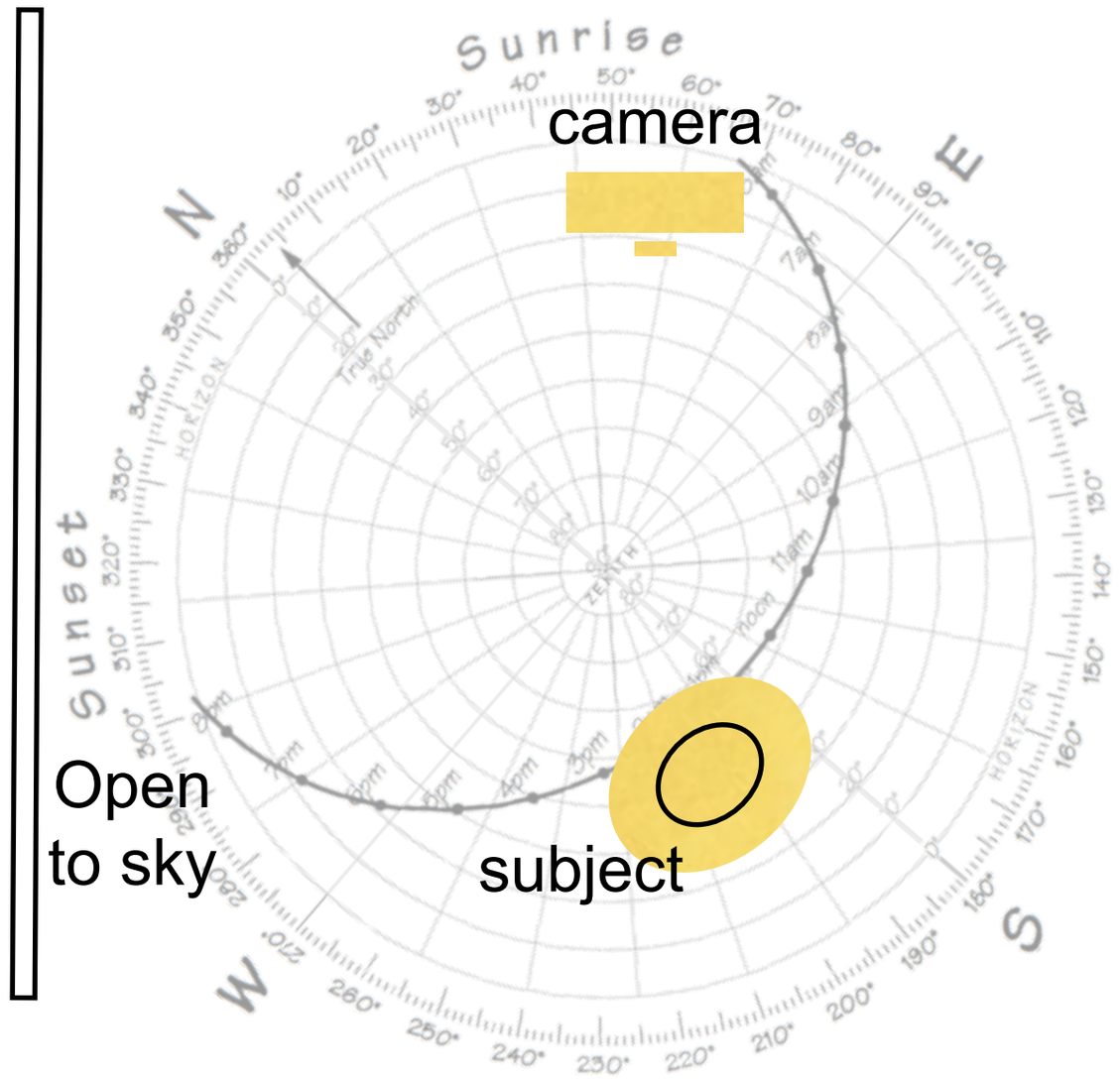
North light gave the key light and the available light through the open south door provided the background illumination.



Creating direction

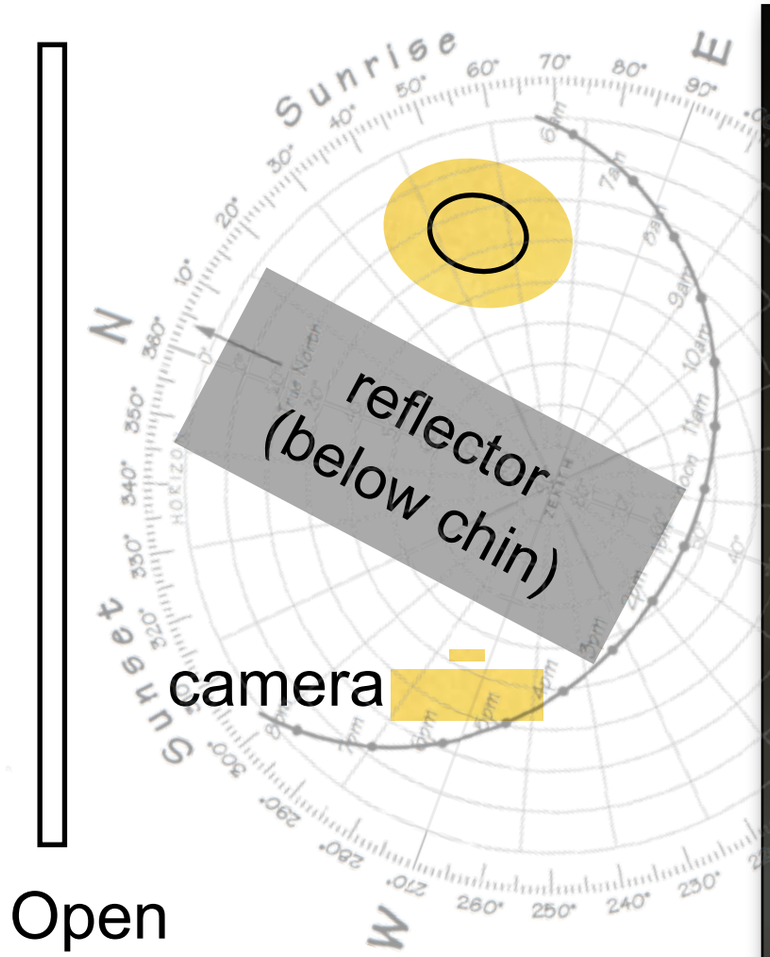
Playing with the angles





In this available light portrait, the subject is placed at an angle to the light so it gives a short pattern of light on his face.

Playing with the angles



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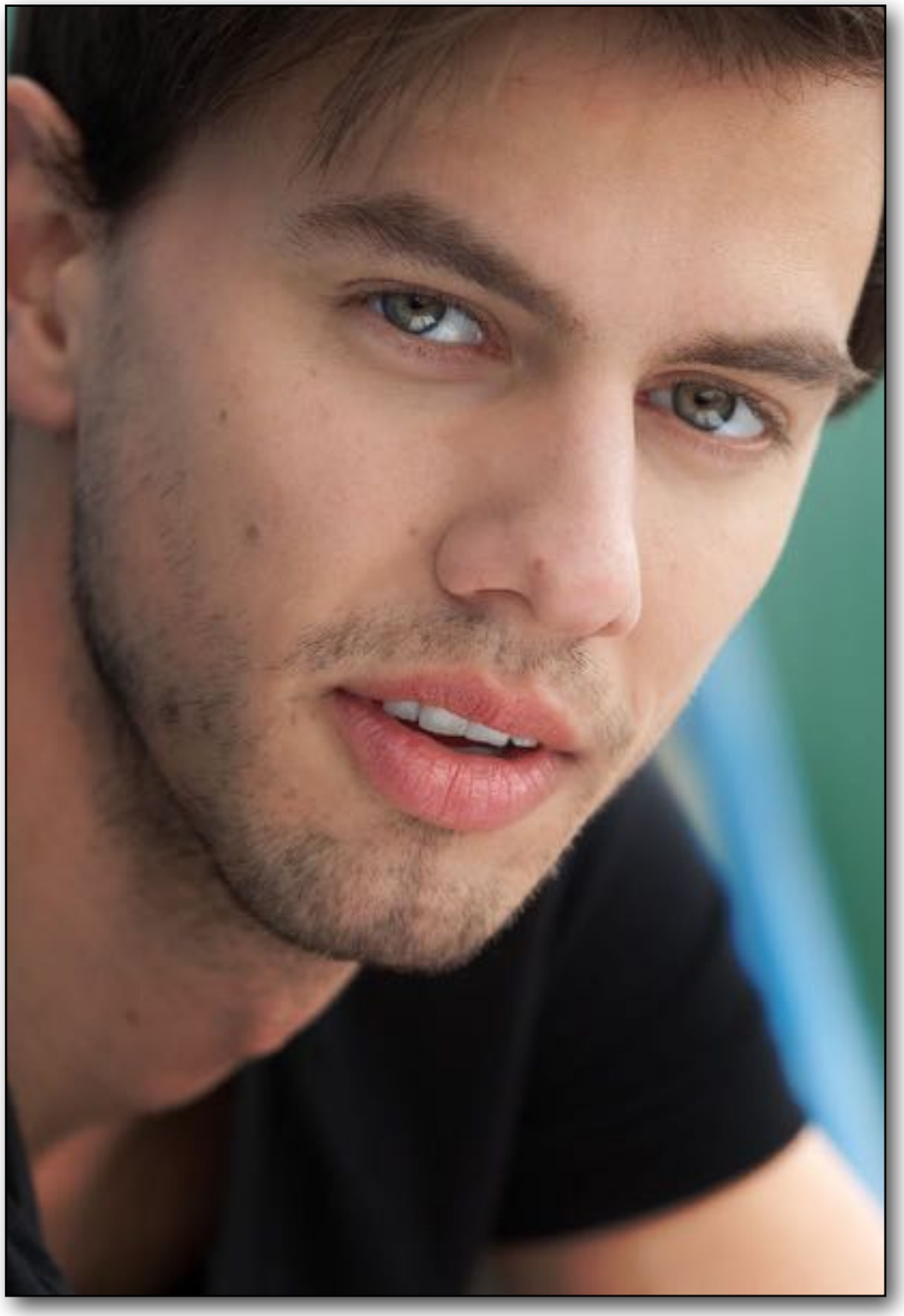

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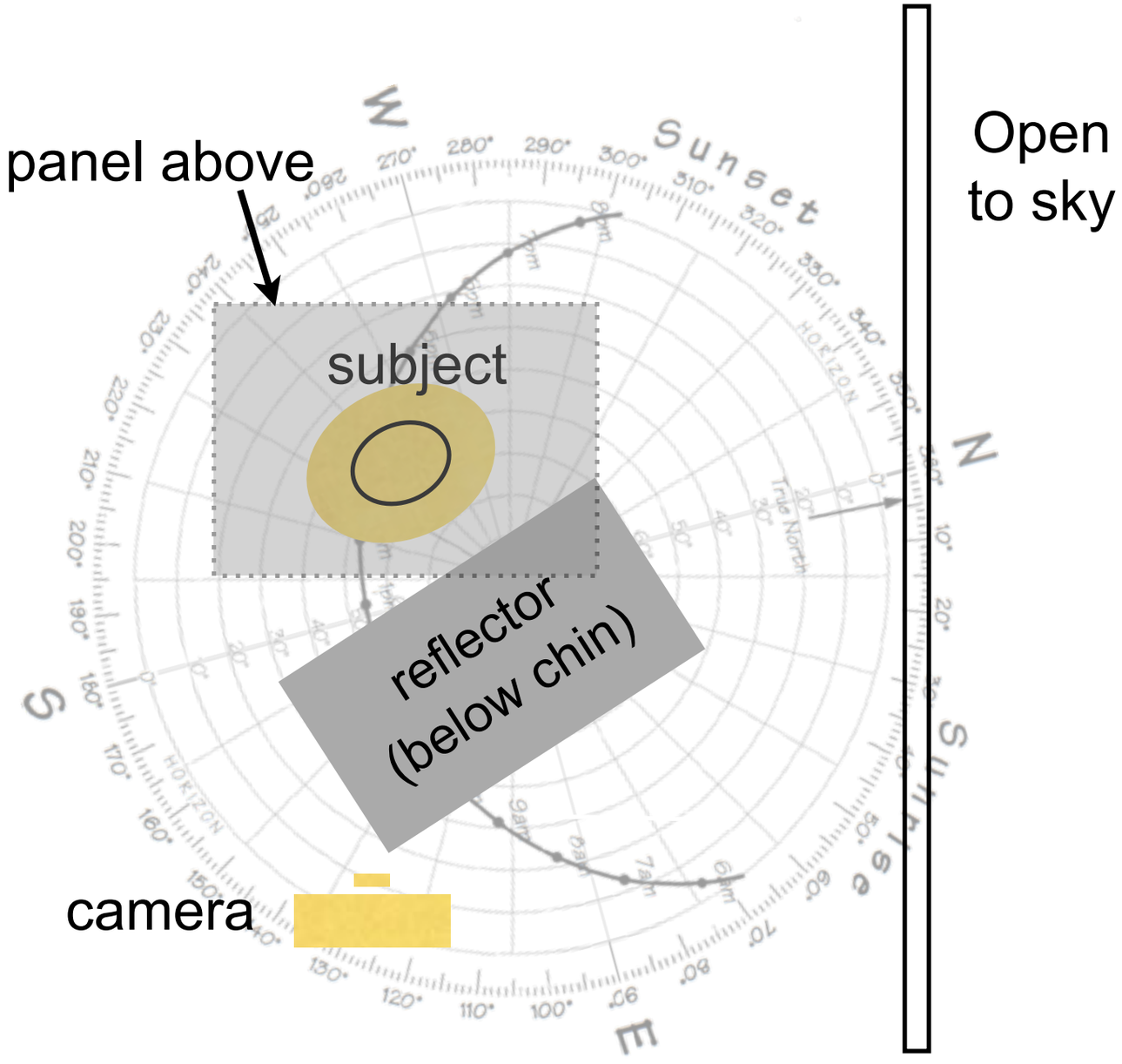
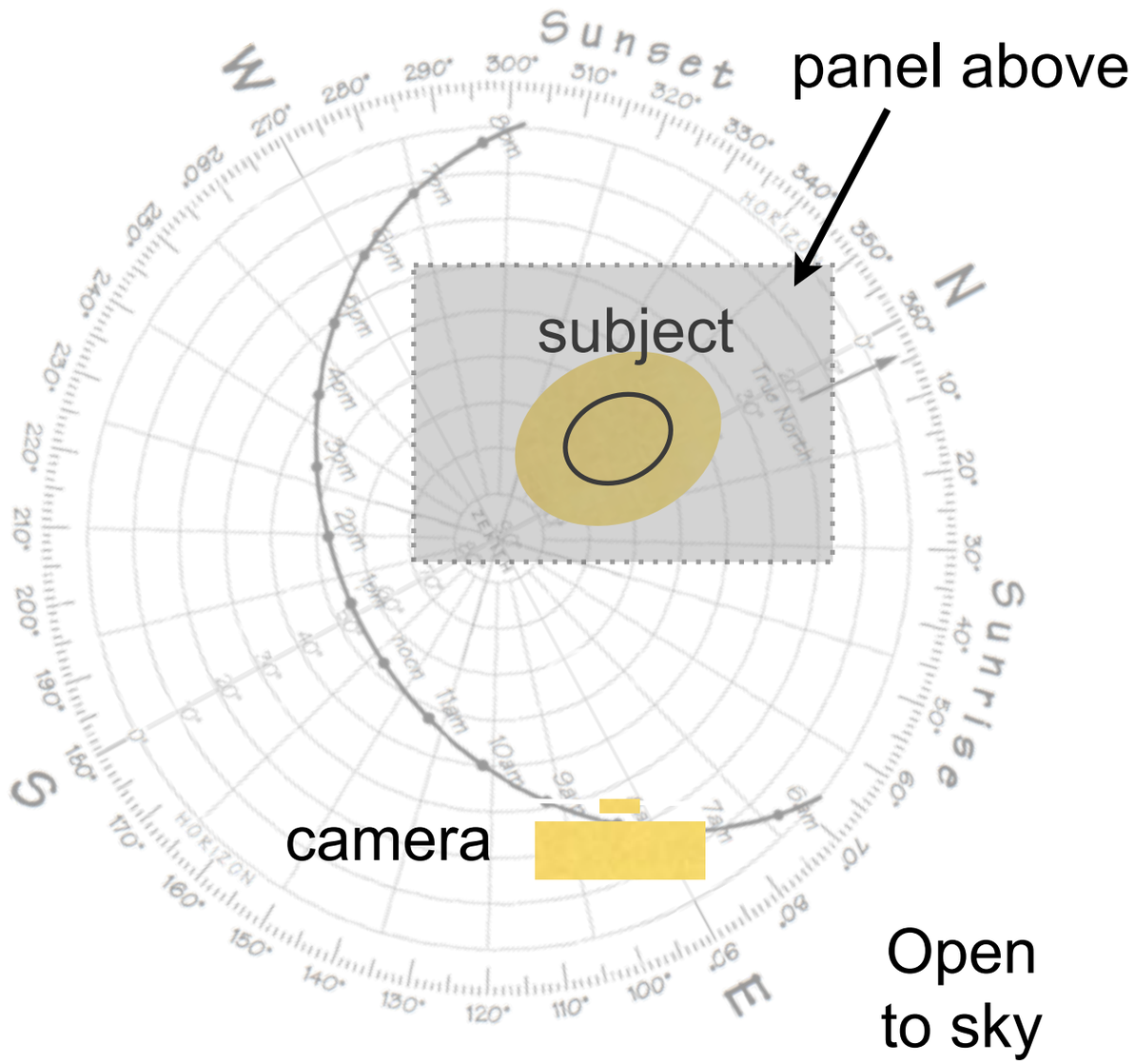


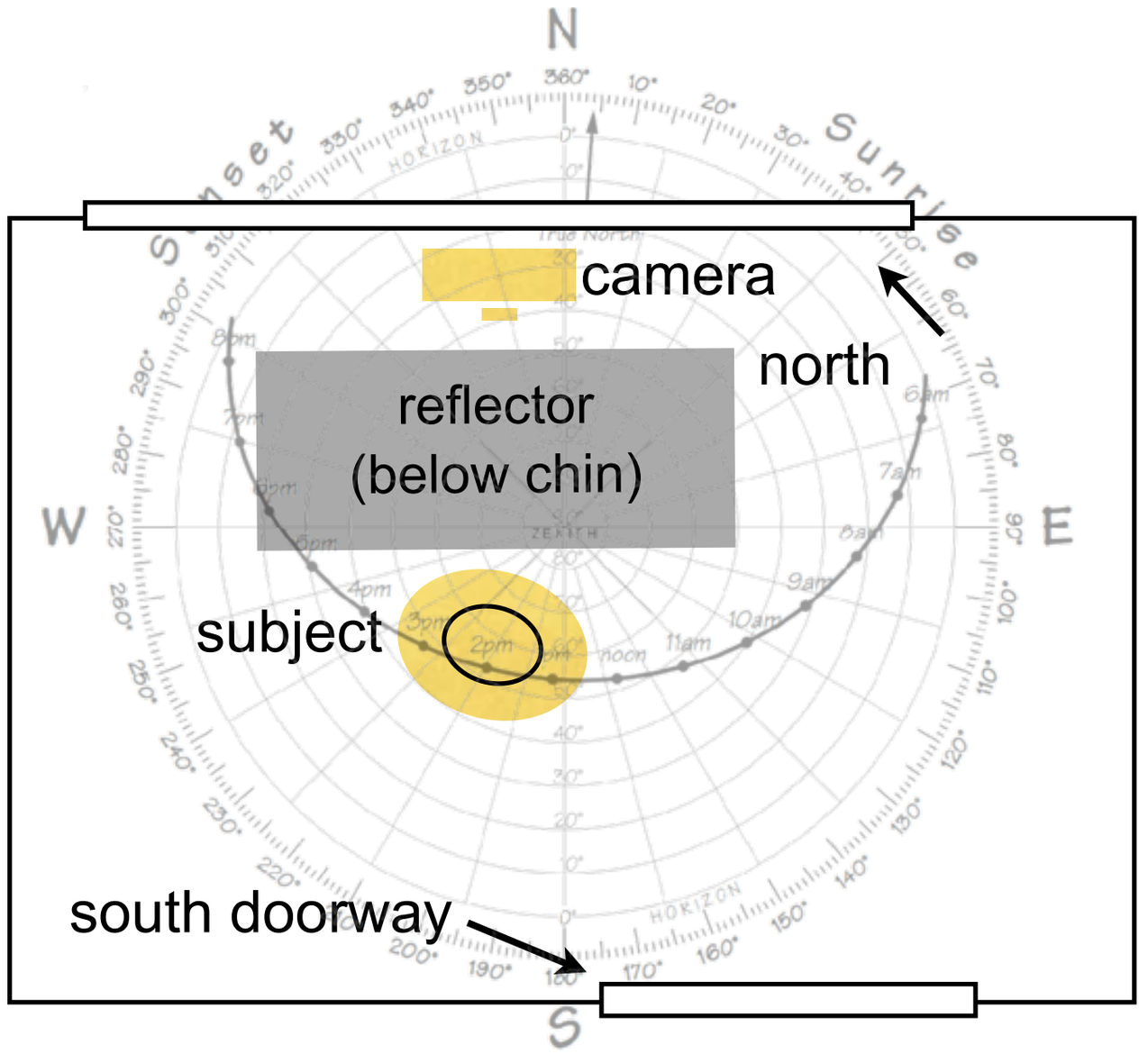
Playing with the angles

The low angle of the evening sun gives an accent light. The open sky is made directional by the solid panel above the subject.

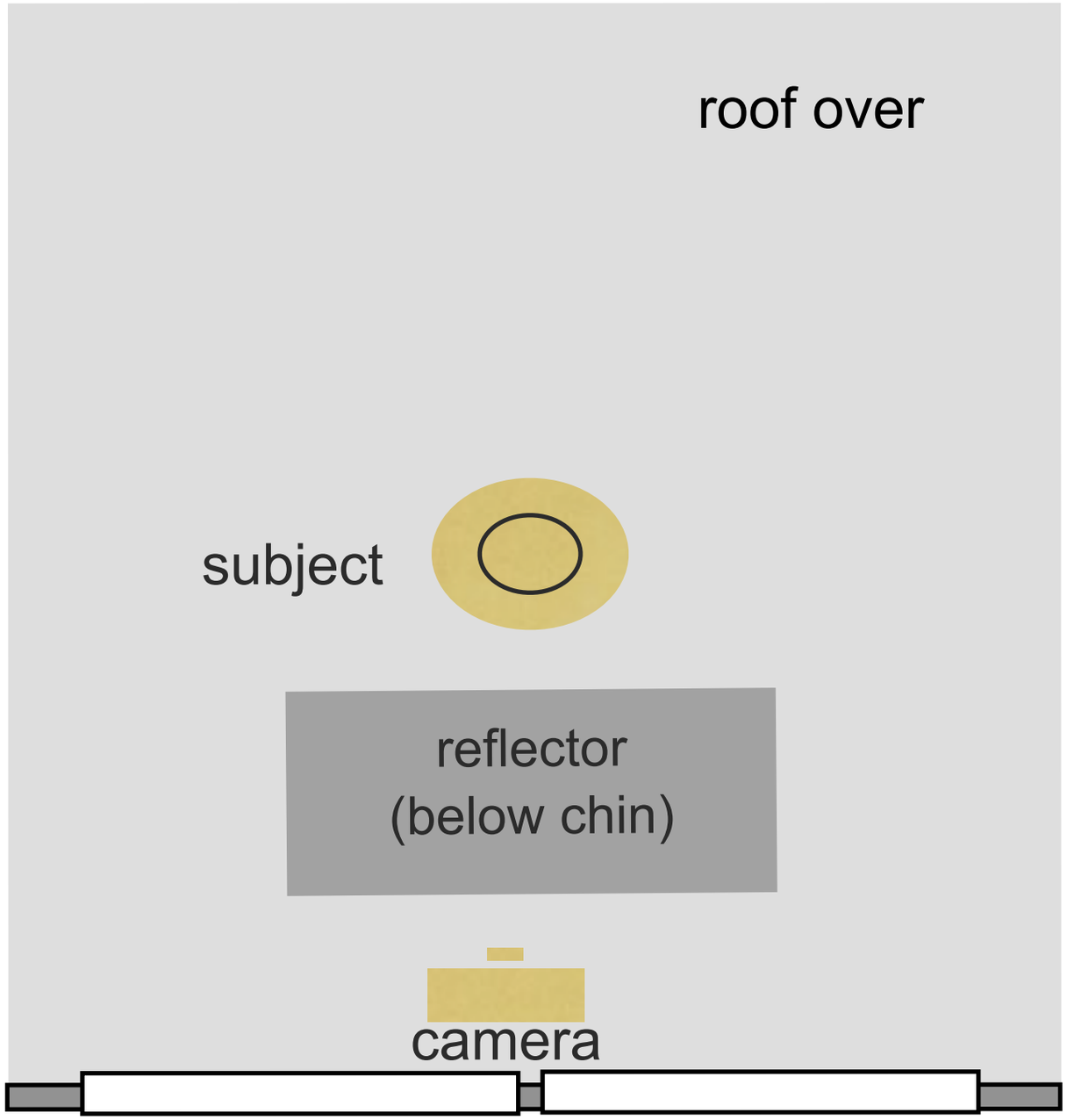


Playing with the angles

By placing the subject between a north and south set of doorways, natural light provided both the key and accent light for this available light portrait.

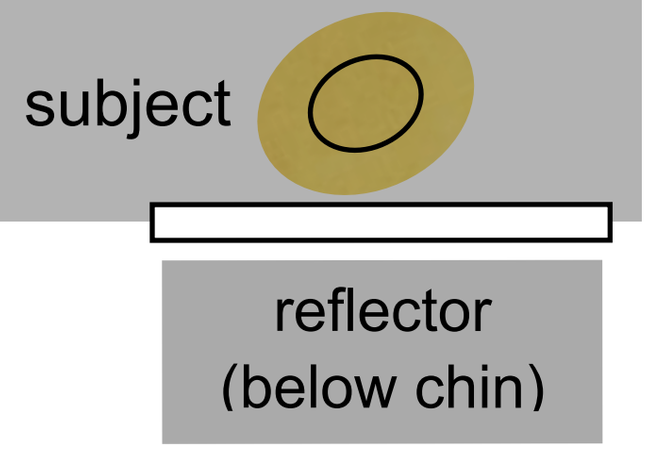


Playing with the angles



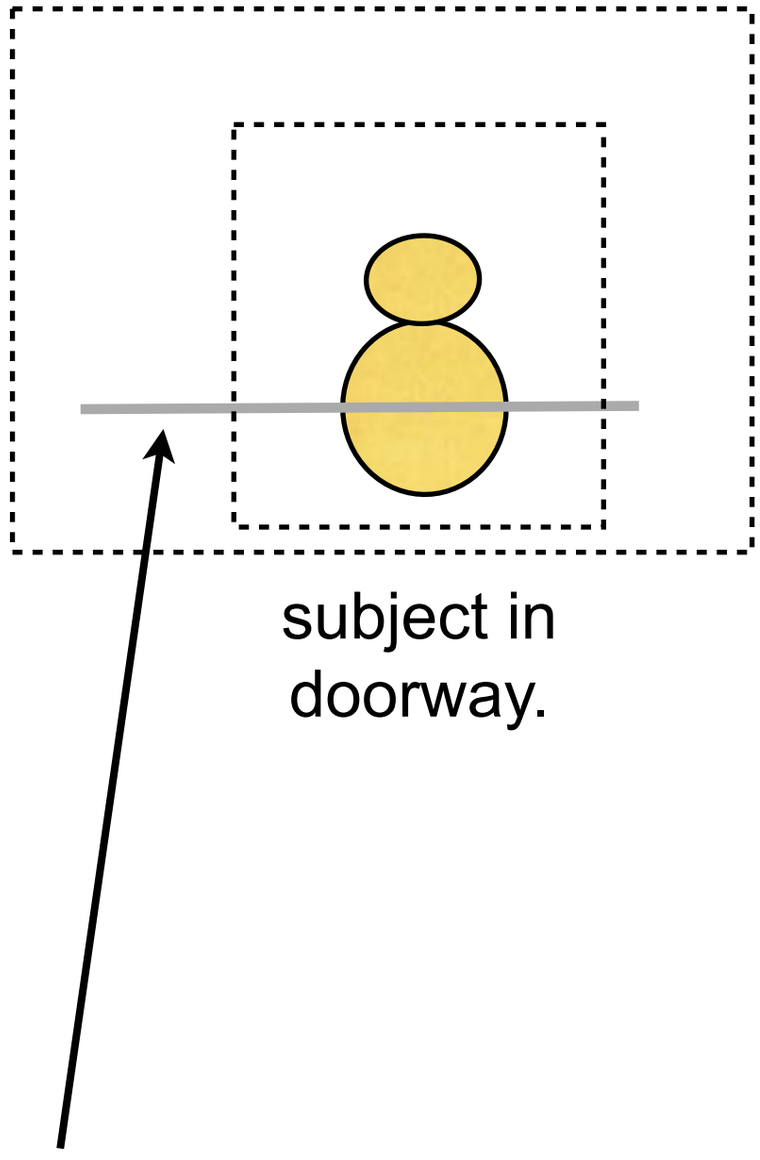
Playing with the angles

subject in the opening of a doorway.



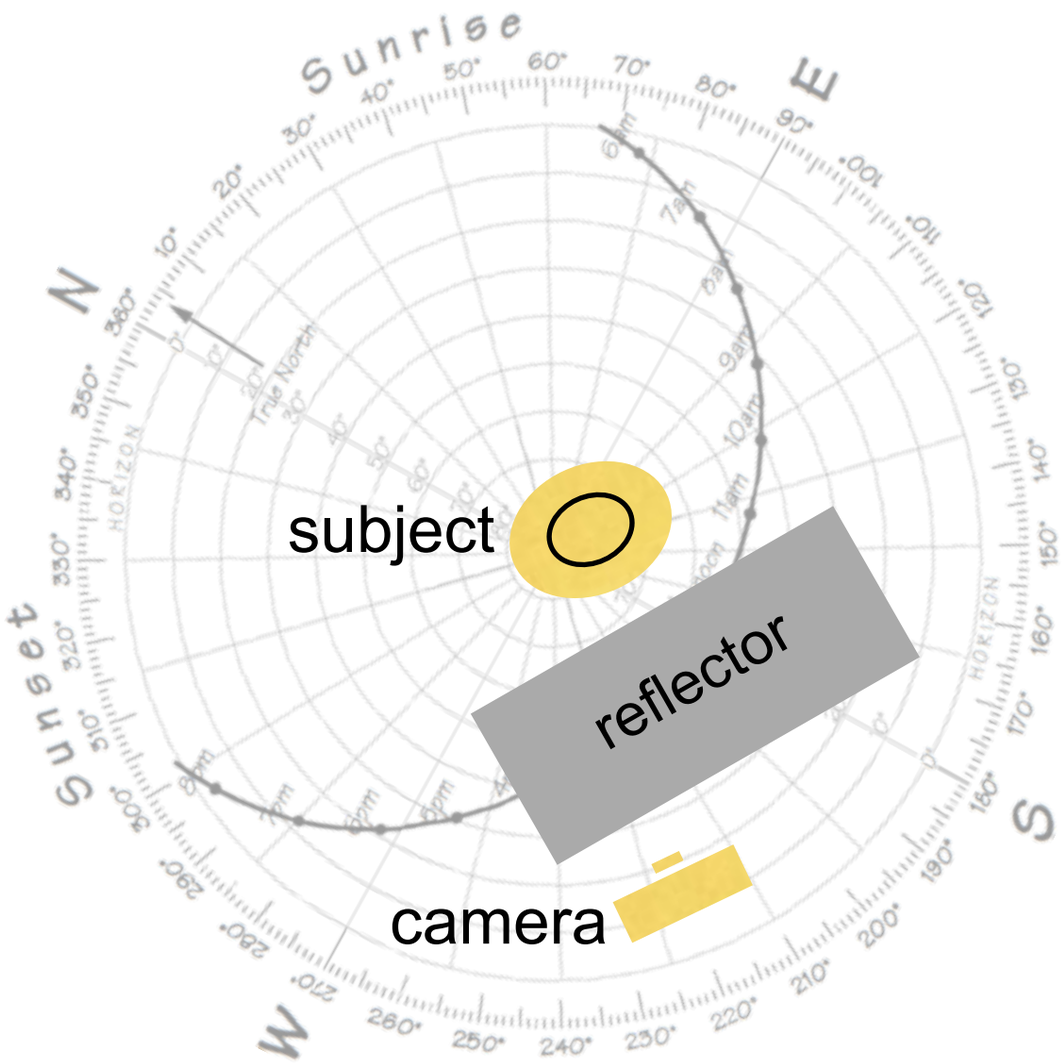
The light of an overcast sky provides the main source of illumination for this environmental portrait. A large silver reflector below the chin keeps the shadows open.

Playing with the angles



By placing the subject under the cover of a doorway the light coming from overhead is directed more frontally.

Playing with the angles



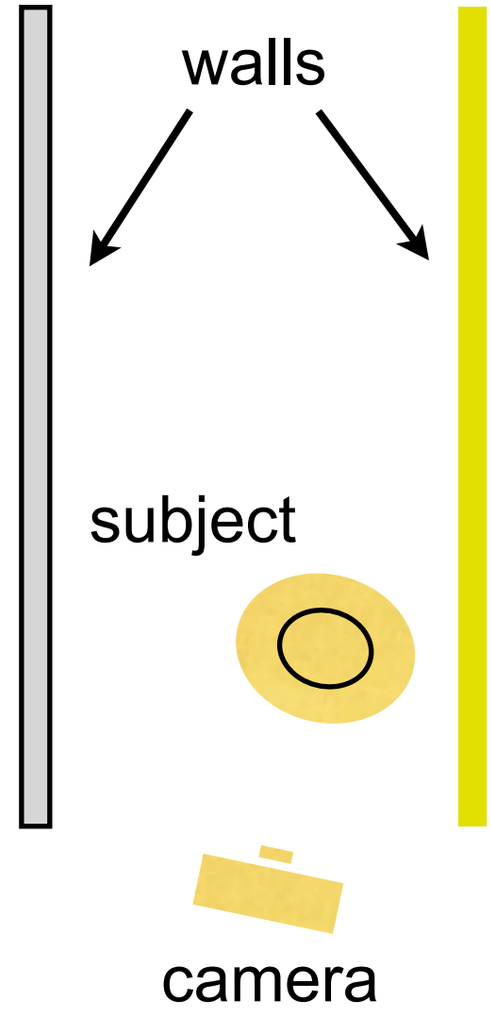
On overcast days, the quality of light from the north or south is about the same. In this portrait the subject was facing south-west so the light gave her face a “short light” pattern.

Natural Light - Colour

On location we have less control over the colour of the scene than we have in the studio.

When selecting a location to work in, be mindful of the surfaces that surround you and your subjects. Colour reflected onto your subject affects the colour balance of the image.

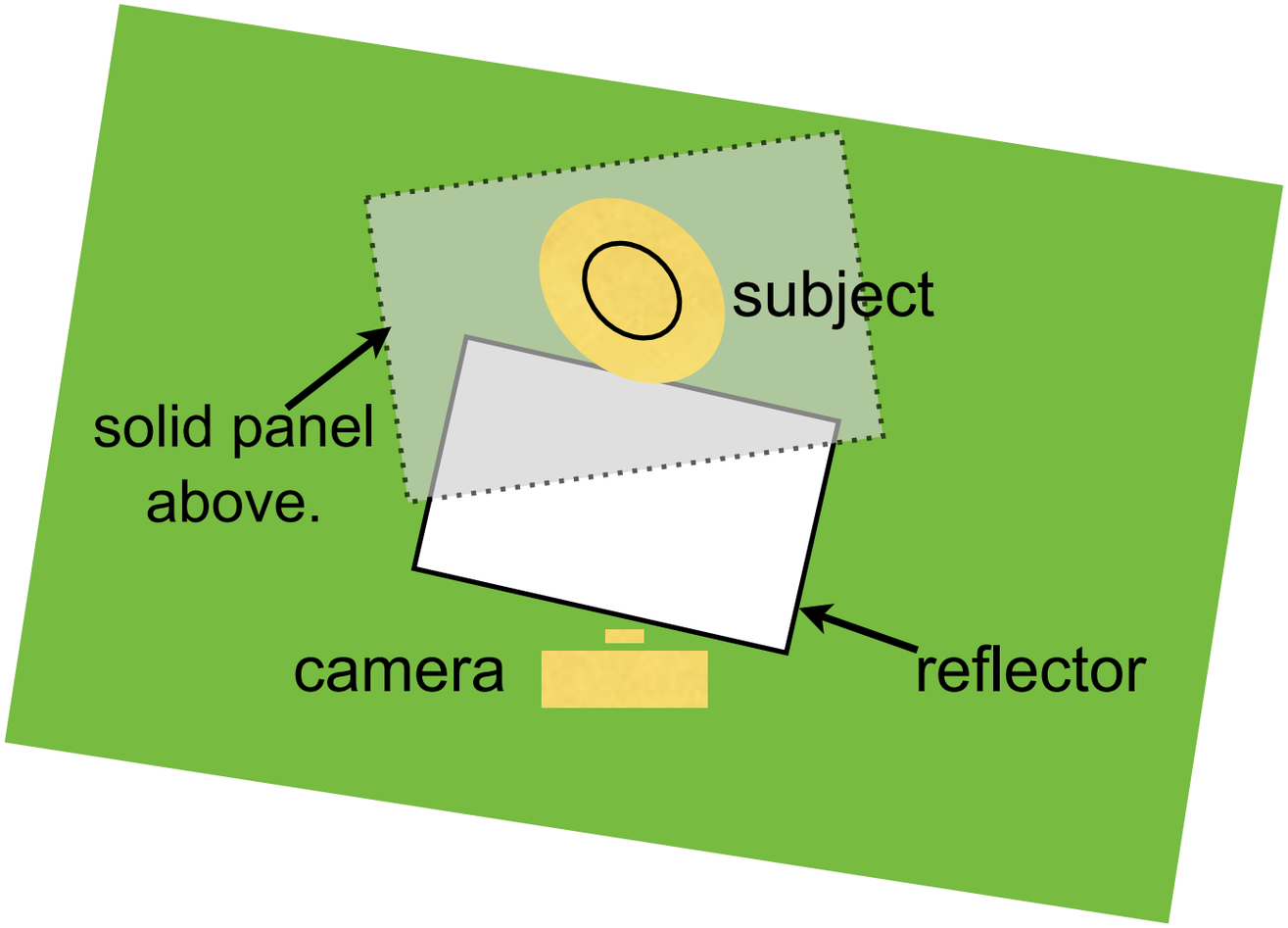
Colour and contamination



In this available light portrait, the subject is placed in the shade of two tall walls in an alley; one was light grey and the other was yellow. Getting correct colour in this photo was a challenge due to the warm reflections from one of the walls.

Colour and contamination

Here, the subject is placed in the shadow of a building at an angle to the north light so it gives a broad pattern of light on his face. A solid panel is placed above the subject to “cut the light” so the face is lit more frontally. A reflector was used below his chin to keep the green grass from contaminating the shadows.



What is a Flash?

Early 20th century flashes. **Don’t try this at home.**

photo: Race Gentry

***Flash powder** is a pyrotechnic composition, a mixture of oxidizer and metallic fuel, which burns quickly and if confined produces a loud report. It is widely used in theatrical pyrotechnics and fireworks (namely salutes, e.g., cherry bombs, M-80s, firecrackers, and cap gun shots) and was once used for flashes in photography.

Examples of theatrical binary flash powders. Note the shared oxidizer (A) powder for some types of fuels (B). Different varieties of flash powder are made from different compositions; most common are potassium perchlorate and aluminium powder. Sometimes, sulfur is included in the mixture to increase the sensitivity. Early formulations used potassium chlorate instead of Potassium Perchlorate.

Flash powder compositions are also used in military pyrotechnics, when production of large amount of noise, light, or infrared radiation is required; e.g. missile decoy flares and stun grenades.

*From Wikipedia, the free encyclopedia

Sync speed

With cameras with focal plane shutters there is a maximum speed that can be used with flash. Most modern cameras have a limit to 1/250 of a second but check the manual. My camera says 1/250 but I find shutter curtain shadowing at 1/200.

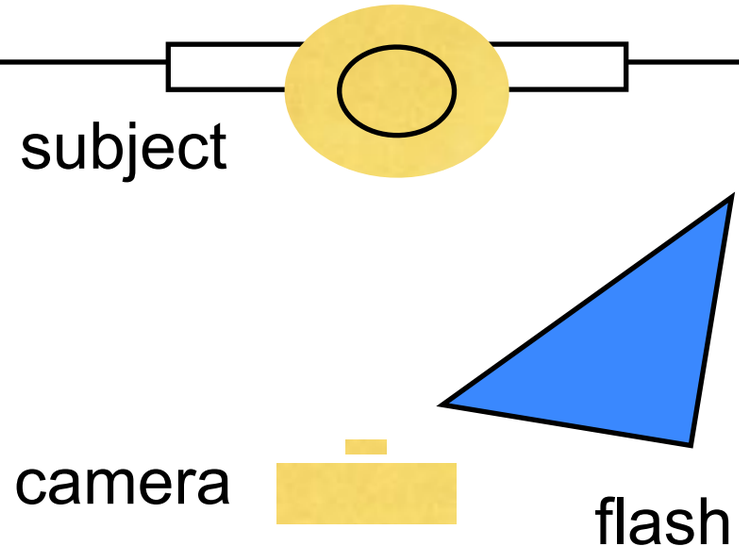
Fitting in a flash

When adding a flash to an ambient exposure we are governed by the “sync speed” of the shutter. We can’t add flash exposure above this maximum speed.

- 1/125 at f16
- 1/250 at f8
- 1/60 at f22
- 1/30 at f32
- 1/1000 at f4
- 1/500 at f5.6

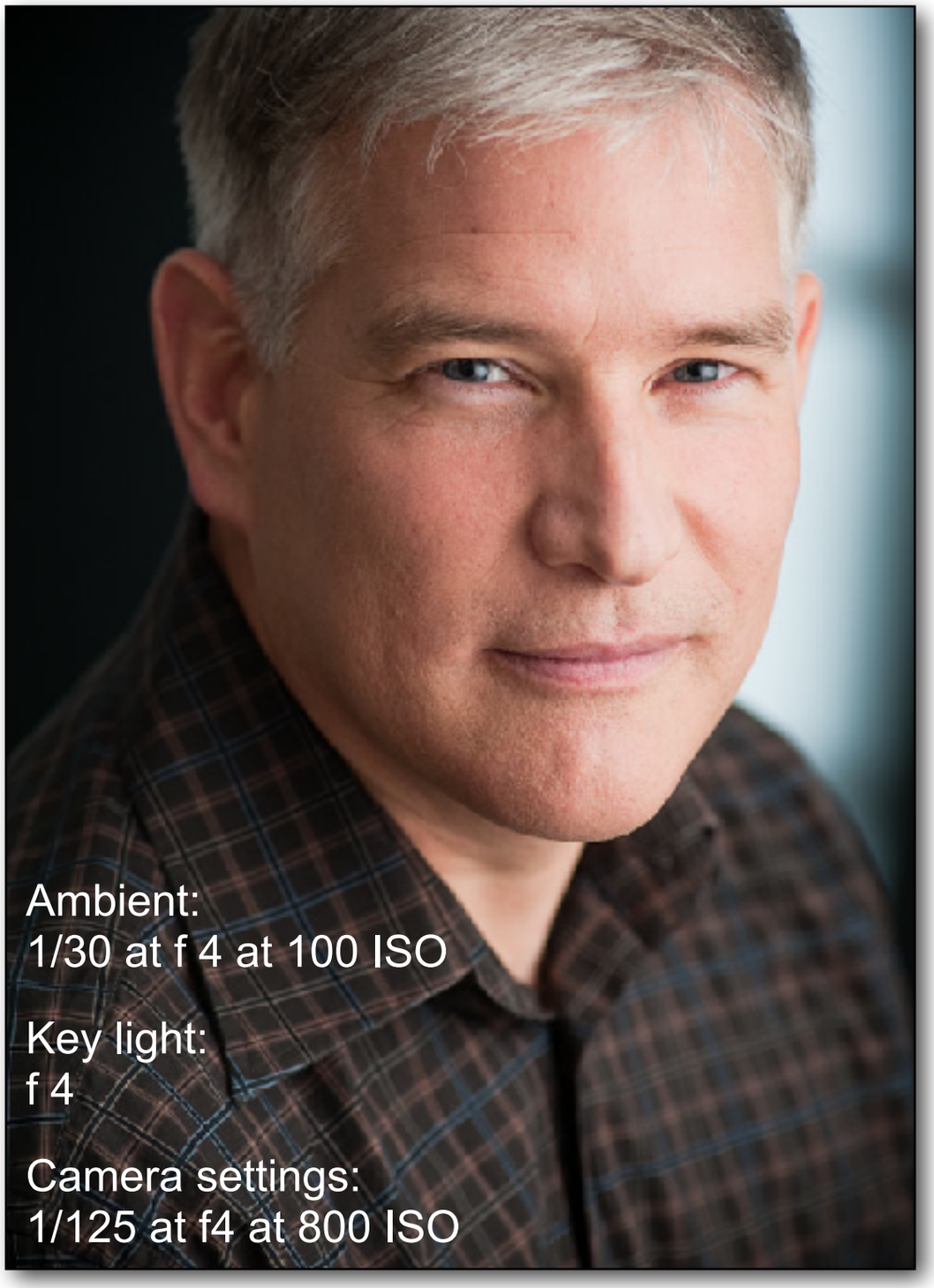
When using a camera with a typical focal plane shutter, which of these combinations would allow us to add some flash exposure?

Flash Fill

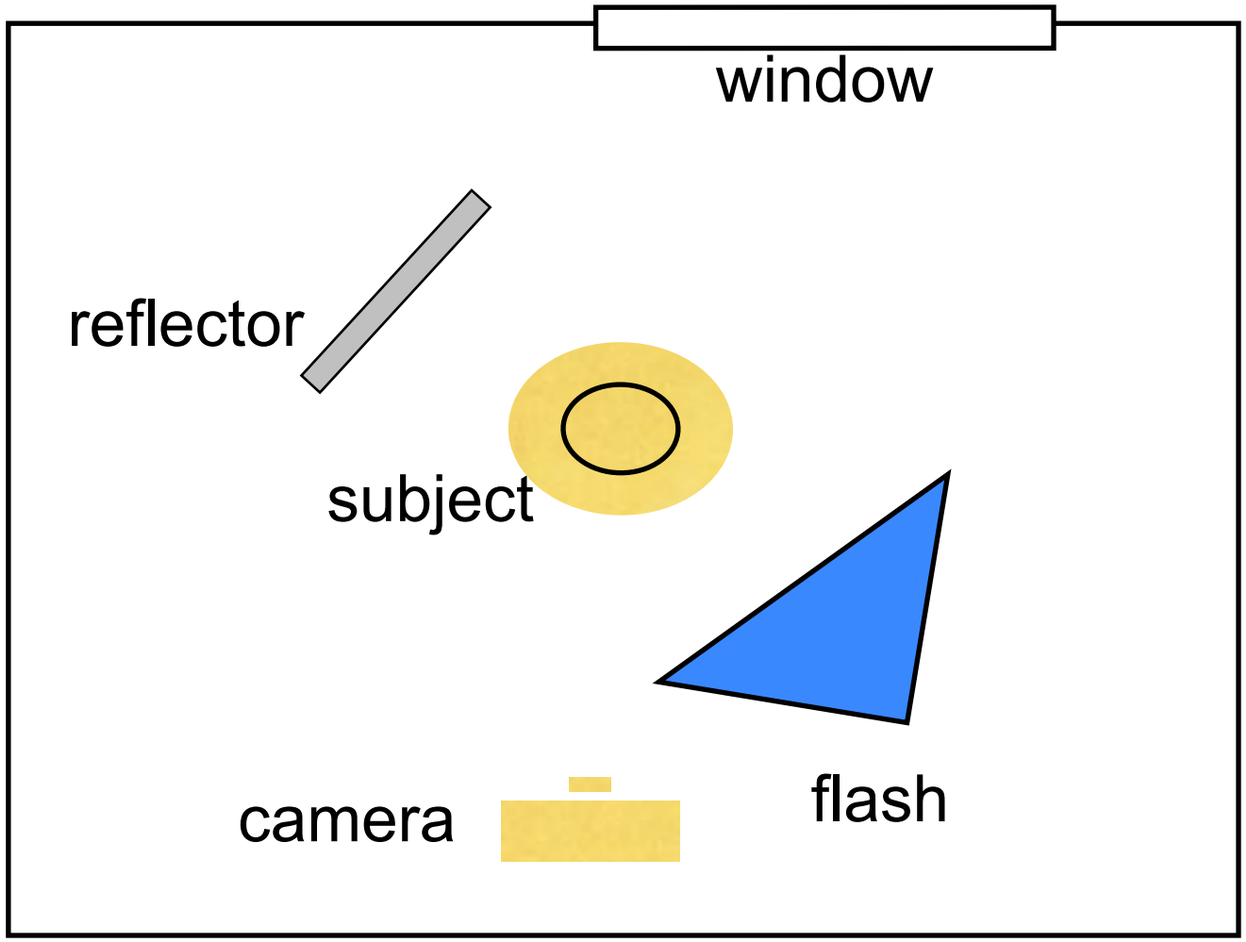


Direct sunlight lit the background and provided an edge highlight around the subject. This sun exposure was 3 stops brighter than the key light which was a large softbox placed to the right of camera. My exposure was made based on the key light at the shutter speed that let in the least amount of ambient light without exceeding my sync speed.

Changing the ISO to suit the ambient levels

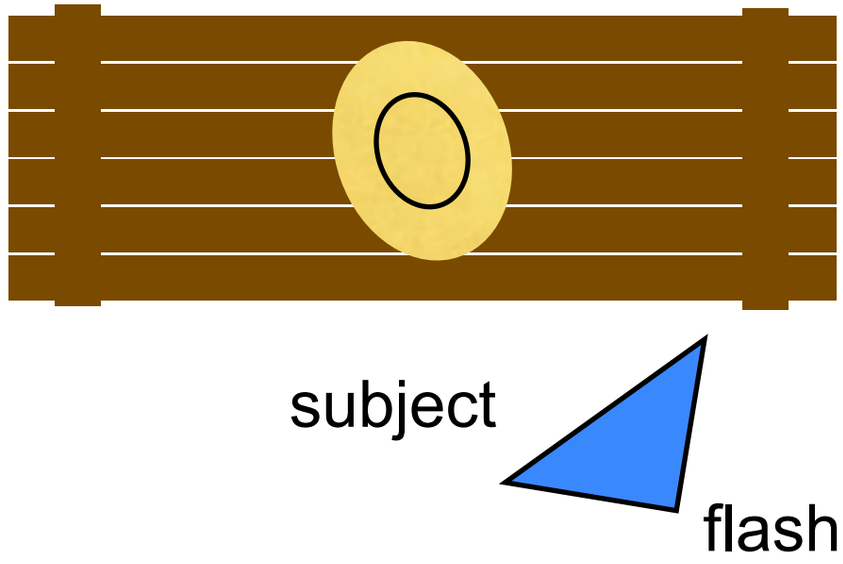


On grey days the ambient light levels are low. Here the ISO of the camera was set to a higher sensitivity to increase the background illumination level.



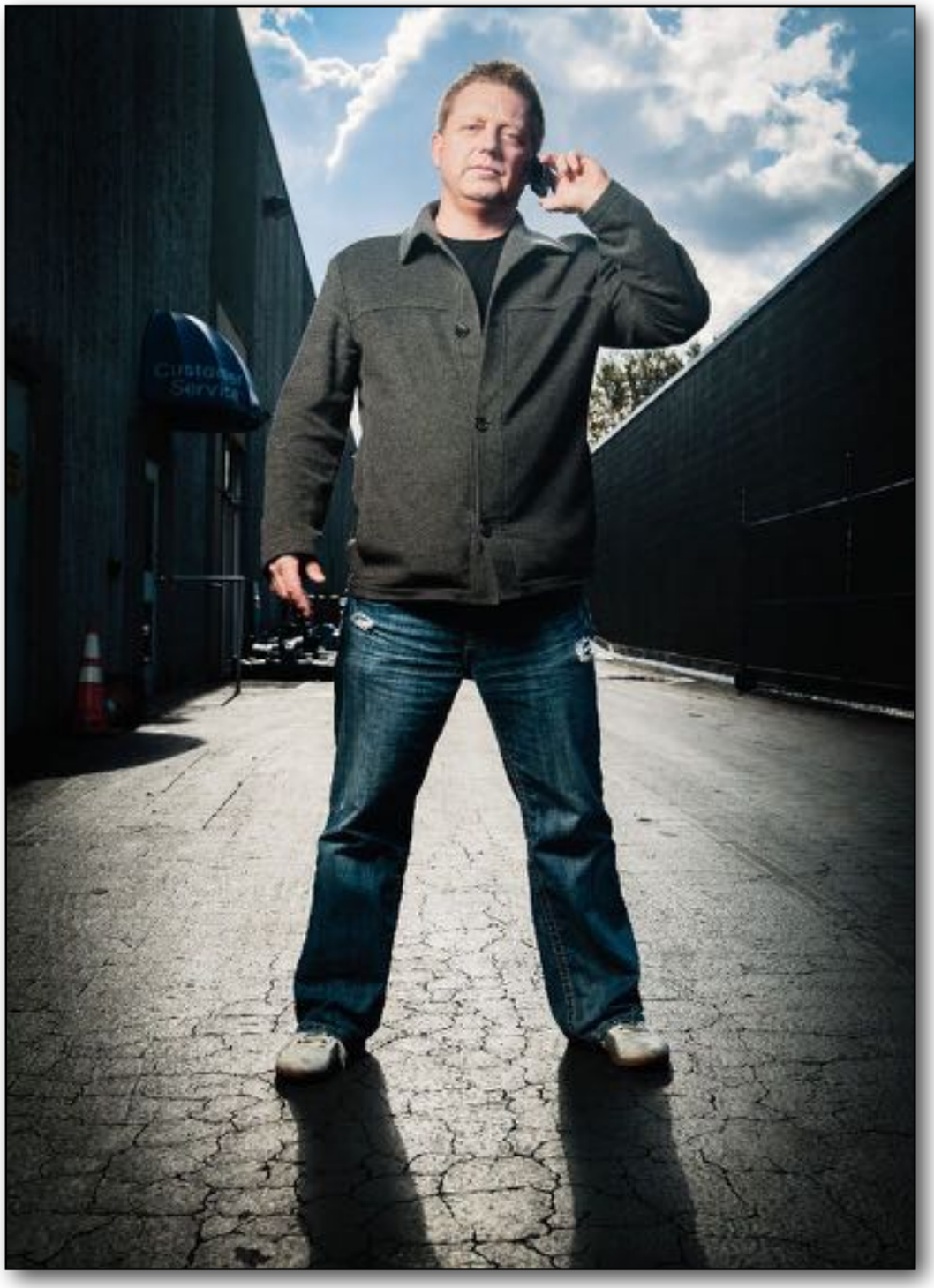
Key Shifting

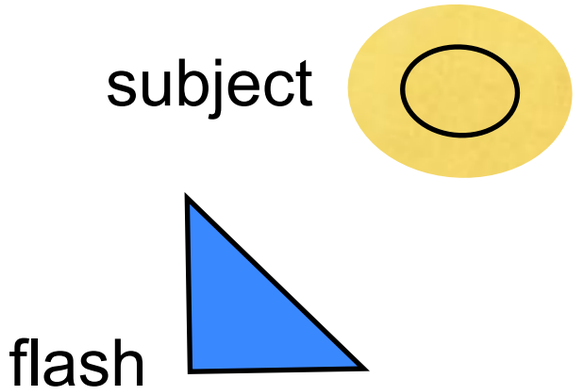
Key Shifting



My client needed a blue background on short notice. I had 1 light, a picnic table on the roof deck, and my camera on a clear blue sky day. My flash was set to give 2 stops light more than ambient exposure called for. Underexposure deepens the blue.

Key Shifting

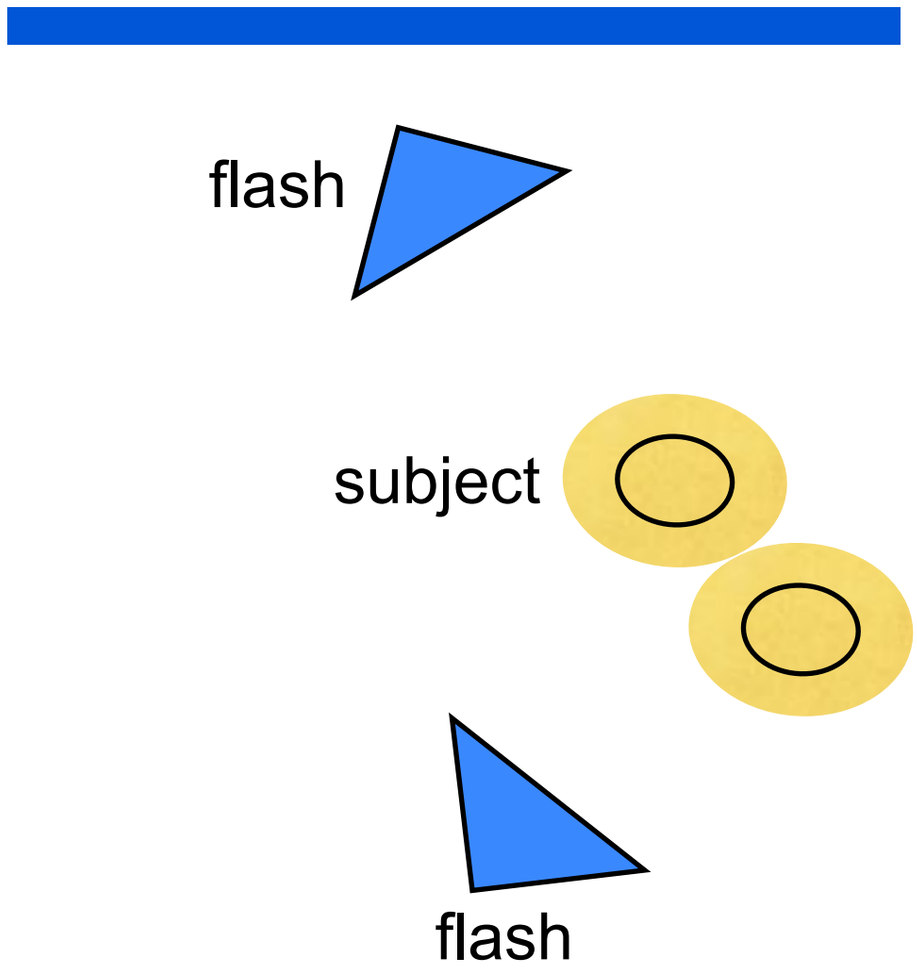




My flash was set to give about 1 stop more light than the ambient light called for.

The camera settings were:
ISO 100 shutter 1/200 aperture at f 9.0
A polarizing filter reduced the light transmitted through the lens.

Key Shifting



By making the photo at 1/125 instead of 1/80th the background is made darker.