Sun Brightness Changing through eclipse

Background:

As the Sun is blocked by the Moon during the eclipse, the amount of light incident on the Earth will be reduced. The amount of light will linearly decrease as the area of the Sun is blocked, with the addition of light scattered into the region from the atmosphere and the corona (so it will never go to zero). However, your naked eyes are not very sensitive. In fact, your eyes will dilate during the process to make it harder to notice. If you were unaware that a partial eclipse was occurring, the Sun would need to be more than 93% blocked before a typical person would notice a change in the brightness around them.

California, which relies on solar power for electrical production, is expecting significant reduction of power (and increased demand) during the partial eclipse. (See https://www.ft.com/content/1e951508-2eae-11e7-9555-23ef563ecf9a?mhq5j=e3).

How to measure:

Since your eyes are not able to accurately measure the difference, the best way is to use a phone app that measures brightness from your camera. For IOS, we suggest the LightMeter app (free) shows an estimate of the lux. Measure the lux on a sheet of white paper or a sidewalk before the eclipse (and without clouds). We will measure other values as a ratio of this number. As the eclipse progresses, measure the lux during the eclipse (longer intervals at first, and longer as the maximum gets closer) as a function of time, divided by your uneclipsed lux values. Take notes from students on (1) estimated fraction of the Sun blocked, and (2) when they notice a difference in the surrounding background light.

Topics for Discussion

When your eyes notice a difference, what is the true light reduction (based on the blocked area)?

This should be 93% (ish) blocked before you notice a significant difference, but everyone's eyes are different.

How does the time reduction of the light (with a graph) compare to the area of the Sun blocked?

This will be more or less linear. The light will be brighter than expected though due to light scattered into the partial shadow.

Why do you think our eyes are not so sensitive to the reduction of light?

In order to have a large range of visible acuteness (i.e. from full daylight to night), our eyes have to work over a large range of lighting conditions.