



Observing the Total Solar Eclipse with Early Learners

Anna Hurst (*Astronomical Society of the Pacific*)

On August 21, 2017, skygazers all across North America will experience what is arguably the most breathtaking of astronomical phenomena: a total solar eclipse. The education staff at the ASP has been preparing for this solar eclipse for a few years now, creating activities, training materials, and hands-on demos to distribute to educators, park rangers, librarians, and amateur astronomers across North America. As the lead educator for the ASP's My Sky Tonight (MST) program, I've been particularly focused on how to best experience the eclipse with young children.

The MST team has created a set of research-based, hands-on astronomy activities for pre-K children. These activities are rich in science practices and are designed to be developmentally appropriate for children aged 3 to 5, though we have found that many of the activities are appealing to older children as well. Many of the activities focus on phenomena that children this age are able to experience directly, and that they find exciting. This list includes phenomena related to the Sun, Moon, and Earth — three objects essential to understanding the solar eclipse.

A solar eclipse is a rare and exciting event that often produces a visceral feeling of awe, but that feeling is only enhanced by the intellectual understanding of what is happening: we are standing on the orb of the Earth, looking toward the very distant yet very bright orb of the Sun, when a third orb, the Moon, passes between us, blocking



A child views an image of the Sun using a Sunspotter at the Lawrence Hall of Science. [ASP]

out the light from the Sun as its shadow passes over us.

But is it worthwhile for very young children to observe the solar eclipse? Should you take the time to share this experience with the pre-K aged children in your life — your daughter, son, niece, nephew, grandchild, or young neighbor? After all, it's unlikely they have developed an understanding of our place on the Earth, the size

and distance of the objects we observe in the sky, or the dynamics of those objects. Should you share the eclipse with a young child? The answer is yes! This is in fact an ideal astronomical event to observe with young children.

First, this event allows young children to observe a powerful, and yet easily accessible, astronomical phenomenon. Most

astronomical phenomena are a challenge to observe because they occur over long periods of time, they happen at such extreme distances that we need to use telescopes to observe them, or they happen at night when young children are sleeping. But not the solar eclipse! This event can be observed by young children in the daytime with only very simple equipment (e.g. safe solar glasses or a pinhole projector).

Second, the solar eclipse is a relatively simple phenomenon — one that children can model using concepts they are already familiar with. The Moon is blocking the light from the Sun, producing a shadow that falls on the Earth. Shadows are a phenomenon that children encounter in their everyday lives, and they are naturally curious about them. Thus, observing this unique and exciting phe-



A child observes changing shadows during a summer camp at the Lawrence Hall of Science. [ASP]

nomon of the Sun going dark during the day can begin a conversation about how and why this might occur.

Third, the eclipse is a powerful social event that may stimulate science conversations about science for weeks and even years to come. Think back to your own earliest memories about astronomy. Were you alone or with other people? A social experience like this one has the potential to be a catalyst for further science exploration for a young child and their whole family and may foster further development of interest in science for the child.

To understand what causes a solar eclipse, one must also have some basic understanding of shadows and what causes them. Young children are familiar with the phenomenon of shadows, but are still working out their ideas about what causes them. During an astronomy summer camp for 4- and 5-year-olds at the Lawrence Hall of Science, one of our partner institutions on My Sky Tonight, children shared their ideas for the definition of a shadow:

"It's when something is blocking the light ... I see my shadow when I'm walking on the sidewalk." – Nasim, age 5

"Sometimes shadows are long." – Rainey, age 4

"So when something's blocking the light, it just reflects a picture black of yourself on the ground." – Tommy, age 5

"Shadows follow you in the sunlight because it's like you're blocking the sunlight except you aren't, it's just the sunlight going over you and it's making your shadow." – Maia, age 5

One of the MST activities, "Bear's Shadow," can prepare young children for the eclipse because it focuses on this shadow phenomenon. Children are invited to recreate scenes from a storybook about shadows by using a scientific model: a flashlight representing the Sun and a figurine representing the bear character from the book. We challenge the children to make the bear's shadow long, short, in front of him, behind him, etc.

"Bear's Shadow" has been one of the most popular of the MST

activities. The storybook draws the children's interest, and then the shadow challenges engage them right at the edge of their abilities. Most of the 4-year-olds who have tried this activity have not immediately figured out how to make a long shadow, for example, but took some time to experiment with moving the flashlight to notice changes to the shadows and then eventually discover how to hold it at a low angle to produce a long shadow. They are then very excited and proud to have figured out the problem on their own!

Understanding shadows is a first step toward understanding the phenomenon of a solar eclipse. For lesson plans and videos of "Bear's Shadow" and the other My Sky Tonight activities, as well as additional related resources, visit www.astrosociety.org/MySkyTonight.

To prepare young children for the experience of the eclipse, we recommend engaging them in advance with related activities, such as "Bear's Shadow," as well as talking to them about what they can expect to observe and experience during the event. Look at photographs of eclipses, and model the eclipse with a bright light and a ball. Ask lots of questions to stimulate children's thinking, for example:

- *What do you notice in the photograph?*
- *If the Sun is in the sky, does the eclipse happen during the day or the night?*
- *What do you think causes a solar eclipse?*
- *What could cause something bright to become dark? Have you ever experienced anything like that?*

The goal of the modeling activity is not for young children to fully understand the details of a solar eclipse; rather, you are providing them with initial exposure to the ideas. This will help them enjoy their experience the day of the eclipse, and provide a foundation for additional learning through their real-world observations of the eclipse.

On the day of the eclipse, be sure that you have a safe solar viewing option. Remind children and adults that they should never look directly at the Sun with their unaided eyes, except during totality.

Safe viewing strategies include observing through a telescope with a solar filter, using solar viewing glasses, or making a projection of the partially eclipsed Sun with a telescope or binoculars, or with a simple pinhole. If you use solar glasses, these should be modified with elastic or tape around the back so they stay put on young children's small faces. These and other safe options for viewing the eclipse can be found in this [Solar Science guide](#) from the National Science Teachers Association.

Be sure to also check out the additional resources on the [ASP's eclipse page](#).

Well in advance of the time of the eclipse, make sure the children have had experience with safely observing the Sun using the same observing options you will be using during the event. Practicing safe solar viewing can start during the beginning of the partial eclipse and provides a useful comparison to later observations.

As the Moon begins to cover the Sun and the eclipse event begins, share your excitement with the children, and talk about your observations together. You might focus the children's observations



A child engages in the "Bear's Shadow" activity, experimenting with light and shadows. [ASP]

(as well as your own!) by asking questions, such as:

- *Do you notice anything different about the Sun yet?*
- *What is covering the Sun?*
- *Is the Sun completely dark? Is there any light at all around the Moon?* (This is a question to ask once totality begins — if you are lucky enough to be in the path of totality! Note that during totality, you can safely observe the eclipse without eye protection, and in fact, you'll need to in order to see anything!)

In addition to directly observing the eclipse, notice what happens to the environment around you and help the children do the same. You might ask questions like:

- *Does it get any darker when the Sun is partially covered?*
- (During totality) *How does it compare to what it is like outside at night?*
- If you are lucky enough to see the total eclipse, take the time to not only notice how dark the surrounding environment gets, but what happens to wildlife (e.g. birds) and to the temperature. *Did you notice what the birds are doing? How does it feel now? Is it warmer or colder?*

After the eclipse, encourage children to draw what they observed and share their observations verbally. We have found that conversations around children's drawings are important opportunities to reveal children's understanding, when their ideas are not easily conveyed by either their verbal abilities or the details of their drawings alone. Their drawings may not be accurate, and they may vary greatly, sometimes showing just the Sun, other times showing the child observing the eclipse, or a drawing of the model you demonstrated earlier. In this case, accuracy is unimportant. Rather, the act of recording observations is a valuable scientific exercise that can be a first step towards more sophisticated scientific representations as they get older.

Young children are natural explorers, learning about their world



An educator models day and night with children at the Lawrence Hall of Science. [ASP]

by experiencing it. While most astronomical phenomena require special equipment to observe, the solar eclipse and changing shadows from the Sun are phenomena that children can both observe directly and explore through models. The total solar eclipse on August 21, 2017 is an opportunity not to be missed, whether you are in the path of totality or in a location where you'll see a partial eclipse, because it brings all of these together in a dramatic way. It is an astronomical phenomenon that children can observe, record, and model, inspiring many science conversations and experiences in the following weeks, months, and even years.

This piece is adapted from: Hurst, A., Plummer, J.D., Gurton, S., Schatz, D., (2017). *Preparing for the eclipse: How to safely observe the Sun with young children*. *Science & Children*, 54(7), 52–57.

About the Author

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Resources

- My Sky Tonight: www.astrosociety.org/MySkyTonight
- National Science Teachers Association Solar Science guide: www.nsta.org/publications/press/extras/files/solarscience/SolarScienceInsert.pdf
- ASP's 2017 Solar Eclipse Resources: www.astrosociety.org/education/2017-solar-eclipse-information-resources/
- Safe solar viewing products from the ASP's online AstroShop: myasp.astrosociety.org/products/eclipse ♦

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