# ThinkSpace: Spatial Thinking in Middle School Astronomy Labs

Patricia S. **Udomprasert,** Alyssa A. **Goodman,** Susan **Sunbury,**
Philip M. **Sadler,** Erin **Johnson,** Mary E. **Dussault**
*Harvard-Smithsonian Center for Astrophysics*

Julia **Plummer**
*Pennsylvania State University*

Helen Zhihui **Zhang**
*Boston College*

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# Project OVERVIEW

ThinkSpace labs teach astronomy while supporting spatial thinking skills, like imagining a scene from multiple viewpoints.

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The Three Labs

1) Moon phases and eclipses
2) planetary systems around stars other than the Sun
3) celestial motions within the broader universe

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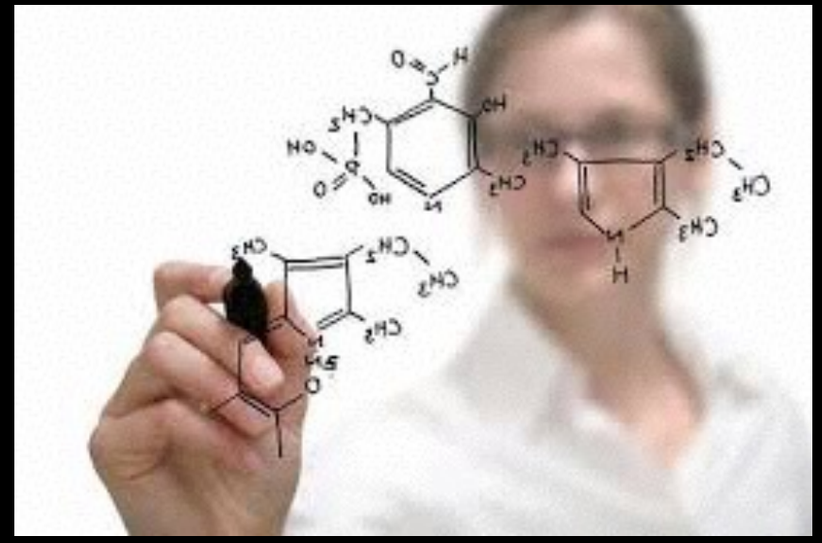

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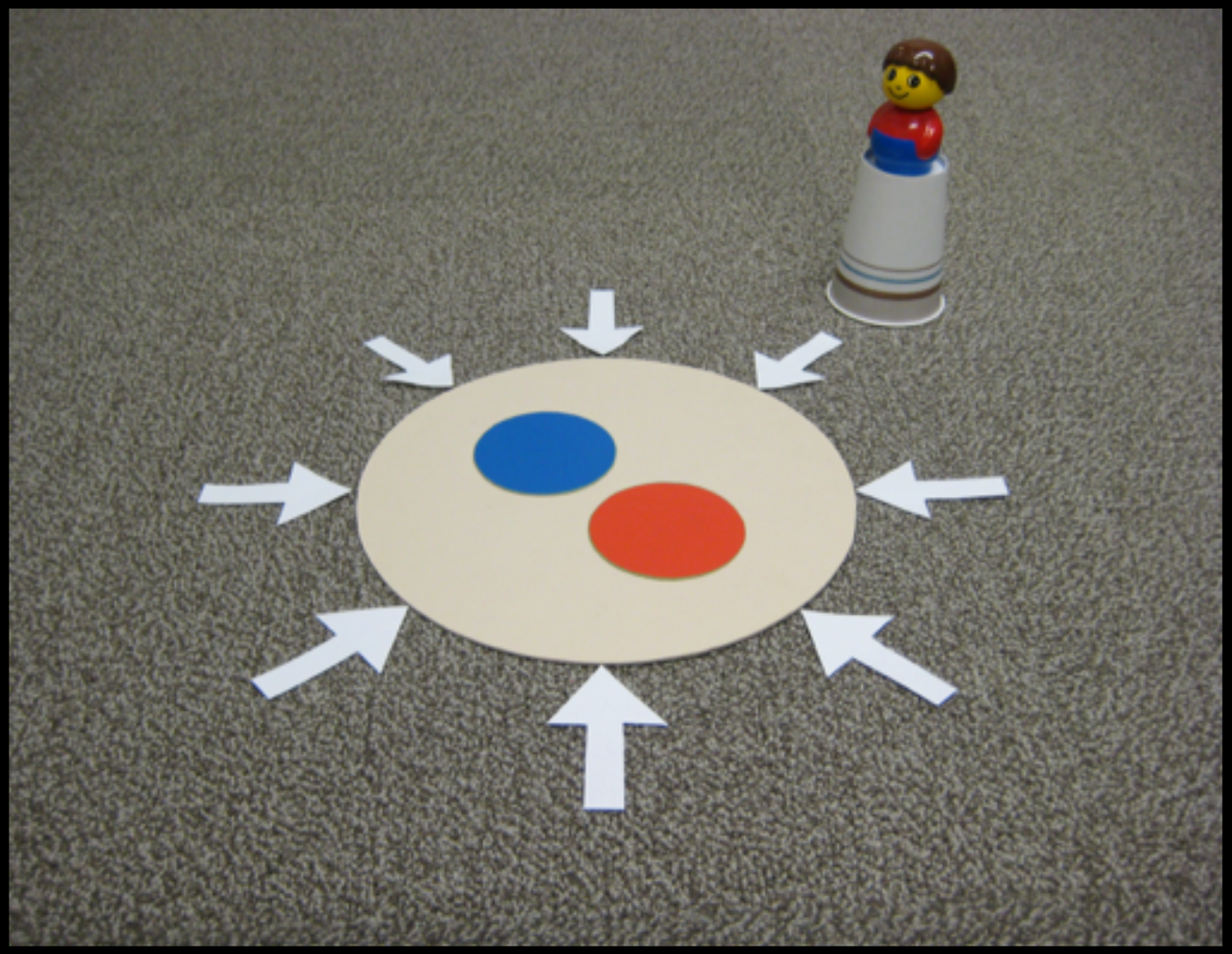

16-item task
Liben, Downs, & Bower, 2015

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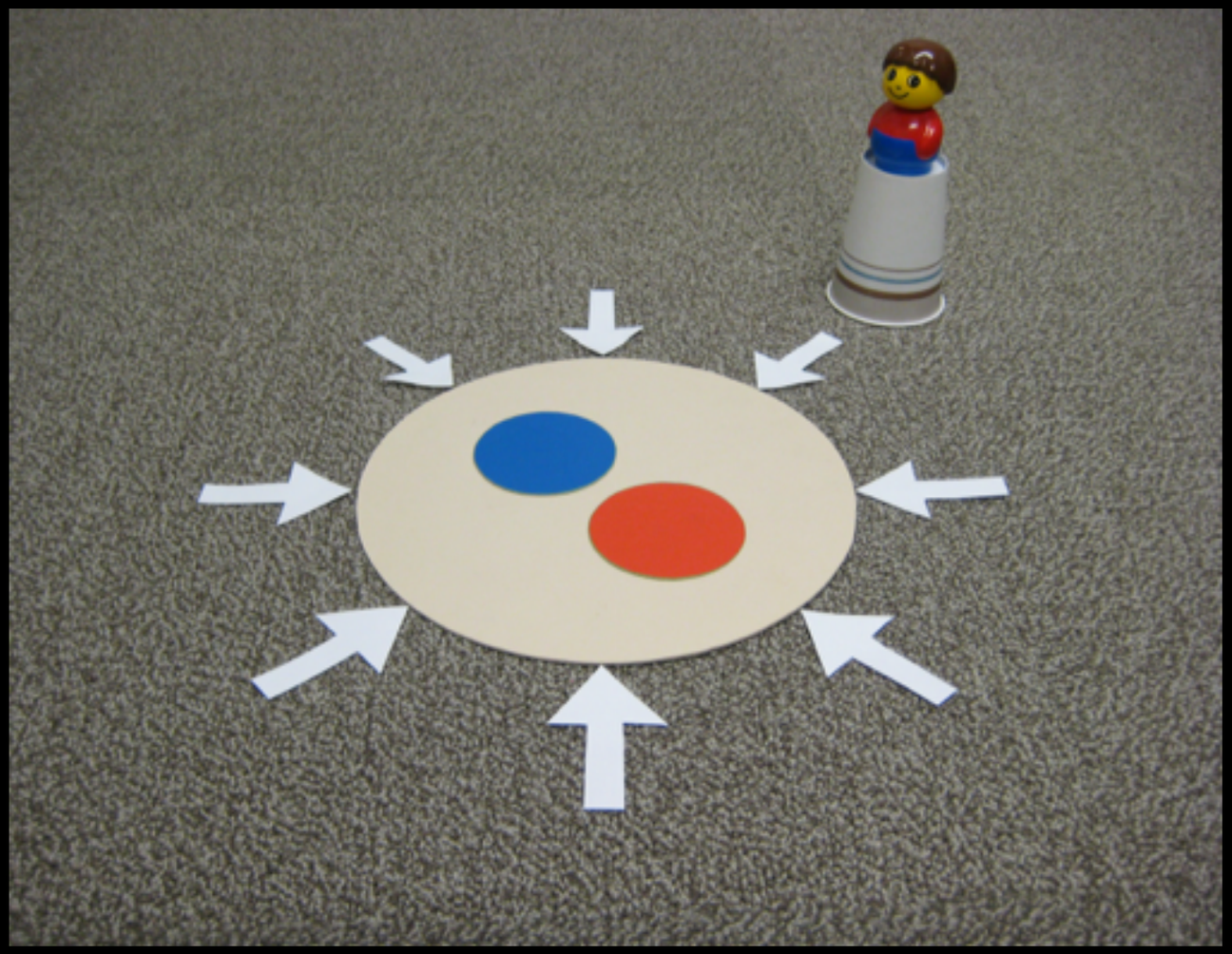

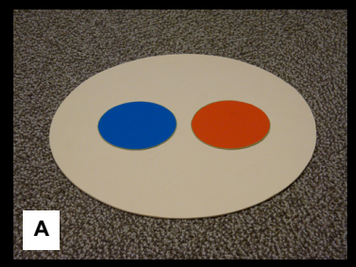


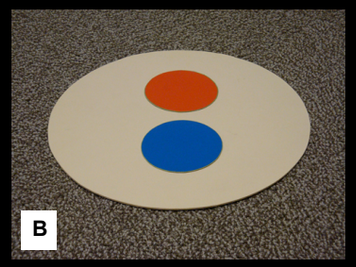


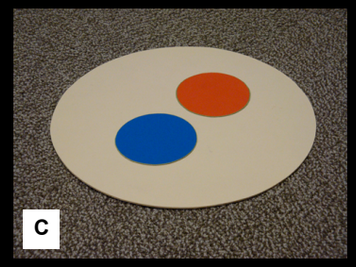


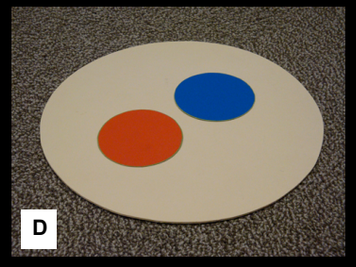


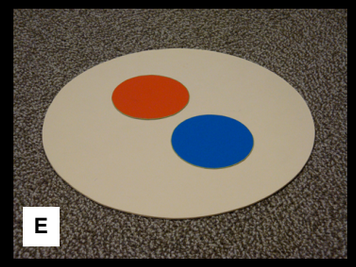


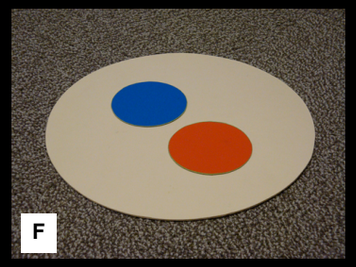


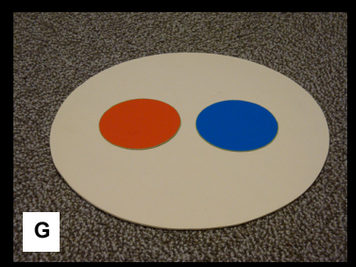


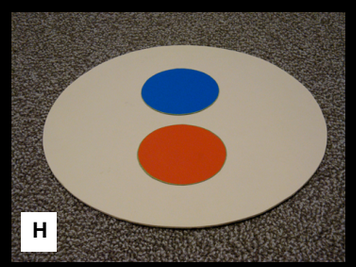


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THINK Space

# WWT ThinkSpace Moon Lab

- 3-day lab experience tested with middle school students
- Focus on WHY we experience Moon Phases and Eclipses
- Students use physical and virtual models (WorldWide Telescope) to understand the Moon phenomena and practice perspective taking skills

# Modeling Moon Phases

## Physical model

lamp/styrofoam balls

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## Virtual model

WorldWide Telescope

# Modeling Moon Phases

**Physical model**

**Virtual model**

- Students use models to practice switching mentally between 2D “sky” view and 3D “space” view of Moon - *perspective taking*

# Research Questions

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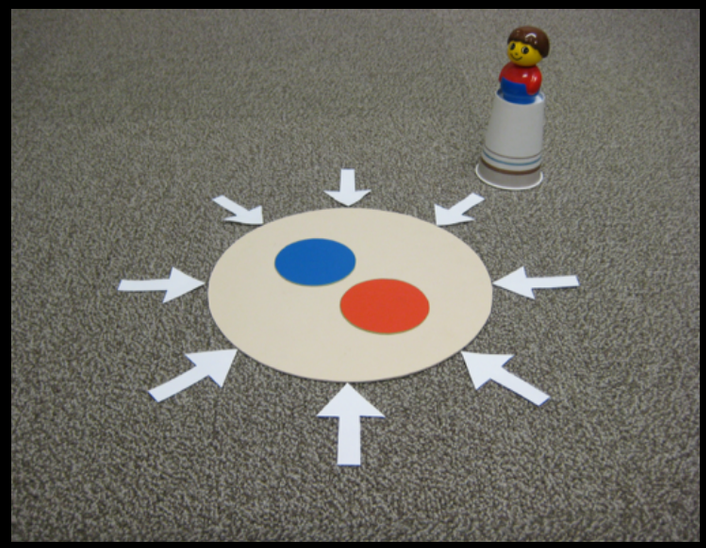

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Pilot Testing, Dec 2015

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**DOUBLE the effect size of a prior version of the Moon Lab that did NOT emphasize perspective taking skills**

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Cohen's d = 0.34±0.07

# Takeaways

- ThinkSpace Moon Lab is effective  (Cohen's d = 2.07±0.12, N=83)
- Perspective taking skills increased  (Cohen's d = 0.34±0.07) - but need to do a test/re-test with control group
- 240 additional students will pilot test Moon Lab in winter/spring 2016
- Goal: learn how to best support students of all spatial thinking abilities in astronomy classes.
- The ThinkSpace Moon Lab is free to download and use.

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*Or Email* pudompra@cfa.harvard.edu