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Using Eye Tracking To Measure How People View Infrared And Visible Astronomical Images

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Introduction

- This study uses eye tracking to examine how people view infrared and visible astronomical images and the effectiveness of captions to better understand how the public perceives and makes decisions concerning astronomical images.
- The tracking of fixation time allows us to observe the percentage of time that participants focused on certain features and the portion of captions read.

Research Questions

- *RQ1:* Where do participants look first when viewing astronomical images, and what features tend to attract their eyes?
- *RQ2:* What differences emerge between visible and infrared images in how long participants look at images and where they look on the images?

Method

- The 47 participants (74% white; 74% women) included students and staff at The University of Alabama in Huntsville.
- Participants were surveyed on expertise and interest in astronomy.
- Participants were then recorded using the Gazepoint GP3 HD eye tracker while viewing either an infrared or visible-light astronomical image of the Eagle Nebula paired with a caption.

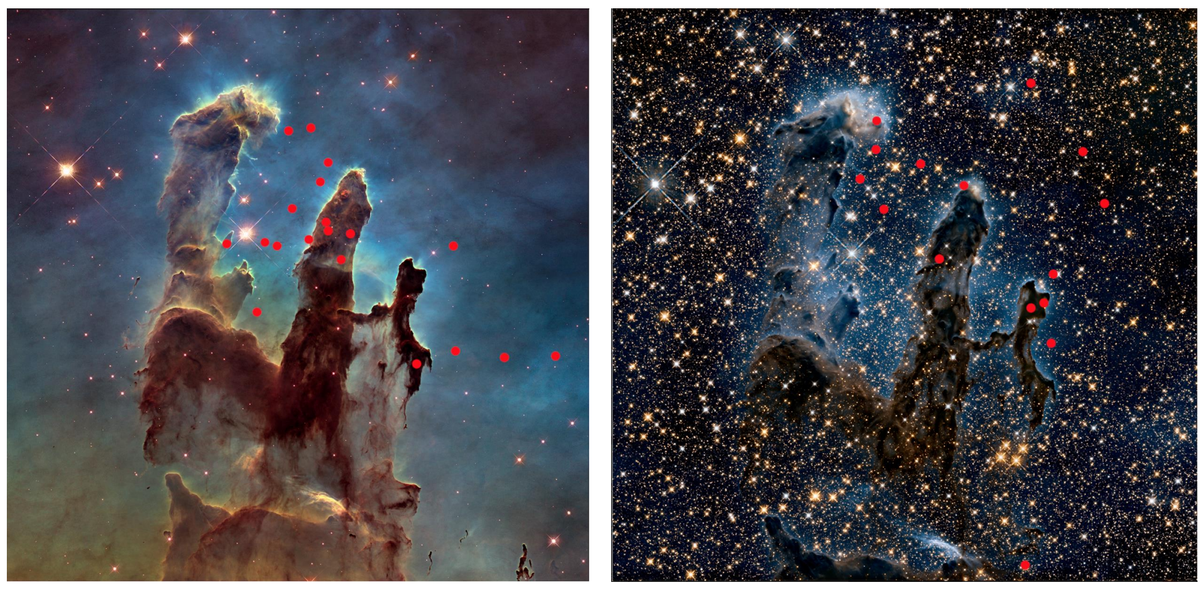

Figure 1. The visible light (left) and infrared light (right) images illustrate the first point each participant first viewed.

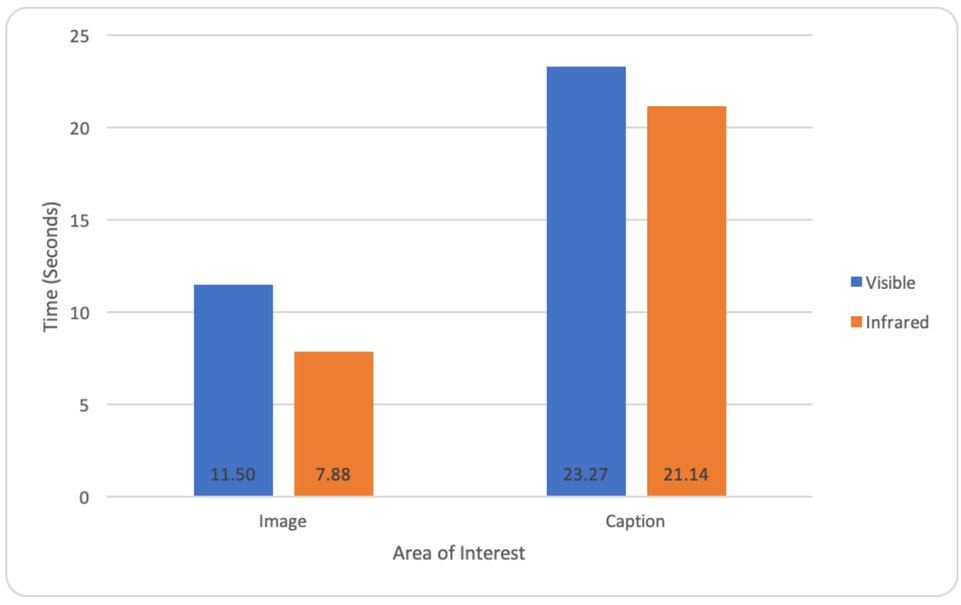

Figure 2. The average view time of the image and caption for visible and infrared.

Results

- *RQ1:* As shown in Figure 1, the initial gaze of participants viewing the visible image fixated more on the center of the image compared to the surrounding area. When first looking at the infrared image, participants tended to view the surrounding area more.
- *RQ2:* As shown in Figure 2, the average viewing time of the image and caption were both higher in the visible image condition compared to the infrared condition. The overall average viewing time was 15% higher in the visible condition than in the visible condition.
- When participants only viewed the infrared image, interest in astronomy grew 57.9%. Meanwhile, 100% of participants had an increased interest in astronomy when only viewing the visible image.

Conclusion

- This study helps determine the type of images that attract the interest of the public and the type of features they first focus on.
- We found that upon viewing the visible image, participants gravitated to the center compared to focusing on the surrounding area.
- When viewing visible images, participants tended to view the image and caption longer and increase their interest in astronomy.
- Future studies could be conducted with eye tracking to better grasp the types of images that help novices learn new concepts in astronomy education, allowing educators and science communicators to improve textbooks and webpages with the human gaze in mind.

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