

Determining the Structure of Galaxies (PM)

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Introduction

In the 18th century two astronomers, Thomas Wright and William Hershel, conducted detailed sky surveys and made maps of star locations. From their observation, they inferred where the Sun was located in the Universe. They were not exactly correct in all their predictions (which were based on their maps), but they were surprisingly close!

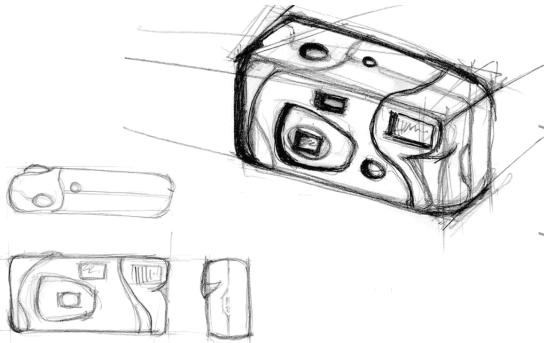
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If you look at an object at night or at an object that is far away, sometimes it is difficult to figure out its exact structure. Think for a moment about when you were young and going to bed at night. You saw a pile of your clothes on a chair and in your mind the pile looked like some monster hiding in the corner of your room!

Source:

http://www.bradfitzpatrick.com/weblog/wp-content/files/lanky_monster_drawing_01.jpg



Another example of the difficulties involved in determining the structure of an object is when you look at an object from different angles. Let's look at my attempt at drawing a simple disposable camera. If I look at the camera from above, the side, or from the front, it looks like three separate objects.

Some of the drawings don't even look like a camera at all! The real camera is actually three-dimensional; that is, it has a depth, width and height.

Procedure:

1. Before we go outside and look at a galaxy model we want you to write down in your lab notebooks what you know and understand about galaxies (make a list).
2. We are going to share with each other our ideas about galaxies, and we are going to compile a list of any possible misconceptions that you may have about galaxies. Before we go outside we will talk about any misconceptions we have.
3. When we go outside each of you should draw and explain in words what you see when we show you the model of a galaxy. Specifically answer the following questions:
 - a. Draw what you see in lab notebook and **describe what you have drawn in words.**

What we are seeing is actually three-dimensional, but because it is dark outside and it is sort of far away, it may be hard for you to see the third dimension.

- b. Draw what you think the galaxy looks like from the top down, from the side, and, if possible, as a three dimensional object. Take a look at the drawing of the disposable camera to get an idea of what we want you to do. **Describe what you have drawn in words**

When everyone is done we will walk over to the model and you will be able to look at it from a different perspective.

4. Make a new drawing of how the galaxy now appears. **Describe in words how the second drawing is different from your first drawing.**

When everyone is done will we share our written descriptions with each other.

Wrap up Question:

Astronomers routinely look at objects in the night sky that are great distances away and appear to be flat. In your lab notebook and in your own words, describe how astronomers use the data that they have collected to make an accurate representation of what a far away object looks like and how this representation may have to change as new data is collected.