



Teacher Version

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Looking Without Seeing

The following California State Science Standards are relevant to this Pathway:

| Grade | Topic | Subsection |
|-------|-----------------------------------|------------|
| 7* | Investigation and Experimentation | 7. c |
| 9-12 | Investigation and Experimentation | 1. d, l |

* Grade 7 Focus on Life Science

[California State Standards](#)

Introduction:

This Pathway will use exhibits to investigate how we see things. Some exhibits, like Seeing Details or Peripheral Vision, address the physical parts of the eye. Other exhibits, Subjective Colors or Count the Bounces, demonstrate the power of your brain to transform what your eyes see. However, there are still many things we don't understand about what we see or don't see, as demonstrated in the exhibit Disappearer.

This Pathway deliberately asks students to do more thinking and experiencing than writing while they are at the museum. Your students' time at the Exploratorium is limited and distinct from classroom time, when they can engage in more polished writing.

Before Your Visit

The BIG question:
Is it possible to look at something and not see it?

What do you think? Discuss or write your ideas or questions.

The motivation behind this question is to get students to identify their current beliefs. You can choose to complete this part in a way that works best for your class. You can brainstorm ideas as a whole class and make notes on a large sheet of paper. You can split students up to groups of three or four to brainstorm ideas and questions. You may assign this as homework and ask students to write a small essay on what they already know. You may even ask students to spend five minutes quietly making notes or discussing this question with their chaperone before they enter the Exploratorium.



During Your Visit

Tips for Teachers:

- *Within reason, answers to most of these questions can and should vary. This Pathway asks visitors to see things in new ways and that's often difficult at first.*
- *Consider assigning only 8 of the 10 exhibits listed here and allowing students to choose which 8 they will complete. Not all exhibits work well for all people.*
- *You could ask your students to choose another exhibit not on this list and describe how it relates to the idea of "looking without seeing."*
- *Please plan for unstructured time during your field trip. Leaving about half of your total field trip visit unstructured allows students to follow their own interests while exploring the museum.*

Directions:

- It may help to work with a partner or two.
- Find the exhibits. You may work with the exhibits in any order.
- Play with the exhibit before you do any writing.
- Have patience. Everyone sees things differently and that's normal.

| Exhibit Title | Done? |
|--|-------|
| <u>Disappearer</u> | |
| <u>Count the Bounces</u> | |
| <u>Bright Black</u> | |
| <u>The Edge Makes the Difference</u> | |
| <u>Seeing Details</u> | |

Explainers (in orange vests) are happy to help you find, use and talk about exhibits.



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Disappearer

1. Try this exhibit.

Hint: Spin the disk at a slow to medium speed. Be sure to look only at the yellow dot in the center.

2. Experiment with this exhibit in other ways. Try staring at another object instead of the yellow dot, stand on another side, place something from your pocket on the Plexiglas, or doing something else.

What did you try?

Answers vary. There are many things you can try.

What happened?

Answers vary. The effect will work no matter what side you stand on although different people may get different results. Three-dimensional objects, including keys, will disappear, although it is hard to make objects larger than three inches disappear. Objects as close to the center as two inches may disappear.

3. Repeat your experiment. Does the same thing happen every time?

Trials are rarely identical. Sometimes an object will disappear immediately. Sometimes it will take a while to disappear.



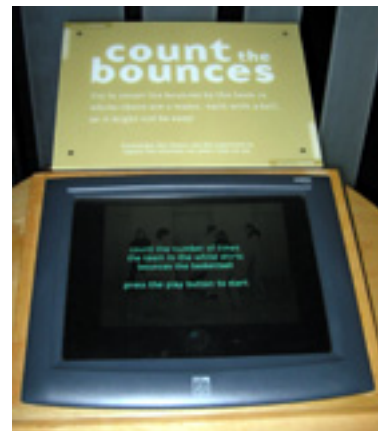
Count the Bounces

1. Did you see something new the second time you watched the video?

Most people do not see the gorilla the first time they try to count the bounces. (It is rare that you can trick yourself into missing the gorilla a second time.)

2. Do you think your parents are right that you can't concentrate on what they are telling you while you watch TV? Why?

Answers will vary but this is a good example of how you can be distracted from things around you when you are focusing on something else.



Bright Black

1. Which panel surprised you the most in this exhibit? Why?

Answers vary. For me, the first panel is the most surprising. I feel like I can see through the trick because it looks gray from the beginning but then I am blown away by the fact that the first panel is really black.

2. Cover the light shining from below. What changed?

The first panel looks black from the beginning. The color of all of the panels stay the same no matter what panel is put next to them.



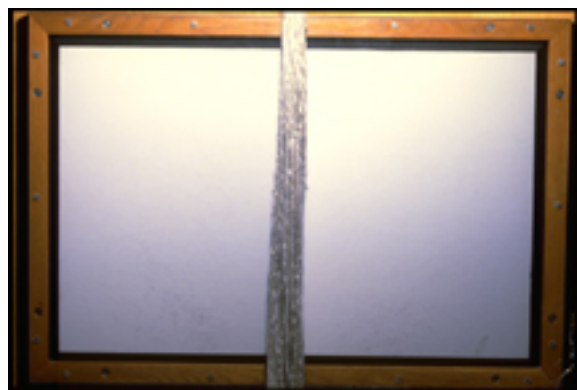
The Edge Makes the Difference

1. Try this exhibit.
2. Although it may look like one uniform color, each of these halves actually changes from lighter on the left to darker on the right. Can you see this?

Some people can see this; others can't. It's very subtle.

3. Cover the border between the two halves with something very thin, like a hair. What did you use? Can you see the difference between the panels?

For me, the panels look identical with no border even when using a strand of hair.



Seeing Details

The fovea is a spot in the center of your retina that has a great concentration of cone cells, allowing your eye to see fine details. The bright flash of light at this exhibit temporarily blinds your fovea but not the rest of your eye.



1. What does the blinded spot look like?

It is a round bright spot that you can't see through. Over time, it changes color from white to blue to red in my eyes.

2. Is it hard to read words when you blind your fovea? **Yes.**

3. What else is affected? (Color? Seeing movement? Seeing shapes?)

I can see most things out of the side of my eye, but I can't see fine details.

Disagreeing About Color

1. Try this exhibit with a group of people. Record which circles match for different members of the group.

Most people find a match somewhere between the 2 o'clock to the 4 o'clock positions. The exhibit designer who created this piece thought that the color at 12 o'clock matched the best. Everyone's eyes are different.

2. Stand back about 20 or 30 steps. From this distance, do you still think the same circle matches the center?

For most people, it looks different from a distance. A spot with more green in it seems to match.

3. There is no right answer to which circle matches the center. How do you feel about that?

Answers vary. Many people find it frustrating at first but it can also provoke an interesting discussion about whether anybody sees things the same way.



Eye Tracker

1. Try this exhibit.
Hint: Have patience. Sometimes the tracker won't work for people with glasses.
2. When the eye tracker is playing back the movement of your eye, look for patterns in what you looked at or didn't look at in the photos. What patterns did you find?

Answers vary. Many people tend to look first at the people in the pictures rather than the surroundings. Bright colors and objects that have a special connection to the viewer also attract attention.



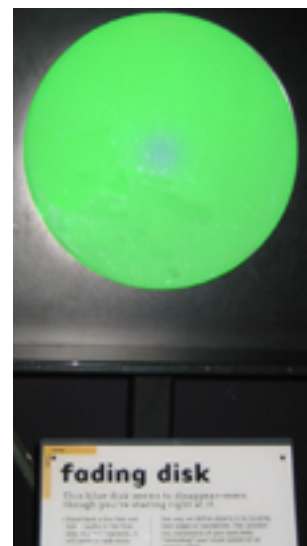
Peripheral Vision

1. When can you first begin to see the color?
Answers vary. I can see the color until about 55 degrees.
2. When can you first begin to read the word?
Answers vary. I can see the word until about 25 degrees.
3. When can you first begin to see the block itself?
Answers vary. I can see the block until about 75 degrees.



Fading Disk

1. Try this exhibit.
2. The same effect happens when you look at the lightly colored parts of Colored Shadows (on the wall by the elevator) and Visual Uncertainty (a painting near the Light Demo table.) Describe what happens after staring for a while at one of these two.
The colors fade to white as long as you don't move your eyes around.



Cheshire Cat

1. Try this exhibit.
Hint: Sometimes one eye works better than the other. Try putting your dominant or stronger eye towards the side.
2. Describe what it looks like when part of your friend's face disappears.

I see a white streak following my hand, taking the place of my friend's face momentarily. Sometimes the smile will linger even if the rest of the face is whited out.



After Your Visit

Putting It Together:

Is it possible to look at something and not see it?

What are some of the limitations of your vision? Discuss or write your ideas based on your experiences with at least two exhibits at the Exploratorium.

If you had the chance, what other type of seeing would you test?

Discuss or write your ideas.

[send your comments & suggestions](#)

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