UNE

UNIVERSITY OF NEW ENGLAND

Center for Excellence in the Neurosciences

Cognition Outreach Modules

Grades K - 5



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Resources

- **http://faculty.washington.edu/chudler/experi.html**
- **http://faculty.washington.edu/chudler/ffacts.html**
- **http://serendip.brynmawr.edu/sci_edu/**
- **http://kidshealth.org/kid/htbw/brain.html**

Speed of Processing/Selective Attention

Activity: Stroop Test

Directions

1. Separate class into ~5 students per group (grades K-3) or in pairs (grades 4-5).

2. Place card 1 and card 2 face down in front of each group/pair of students.

3. Have one person (teacher/aid or partner) hold a stop watch or watch a clock in the room with a second hand.

4. Instruct the students (one at a time) to turn over card 1, and read the "COLOR" they see the words written in.
    a. The person watching the clock will time each student (in seconds) on how long it takes each to CORRECTLY read the COLORS displayed on the card. Each student will record their own time.

5. Once everyone gets through card 1 have the students flip card 2 over, reading again the "COLOR" they see (NOT the word).
    a. The timer will watch the stop watch or clock and tell each student how long (in seconds) it took them to read the colors on the card. Each student will record their own time.

6. Once everyone is finished use the discussion points (pg 4) to discuss what is happening.
    a. You can also have the class repeat it, does it get easier once you know what to expect?
    b. What if they cover everything but the first letter of the words, does it get easier or harder to say just the color?

Stroop Test Cards

CARD # 1

RED	YELLOW	ORANGE	BLACK	GREEN
PINK	BLUE	BROWN	GRAY	BLACK
BLUE	RED	GREEN	ORANGE	RED
GRAY	YELLOW	PINK	BLUE	BROWN
ORANGE	GREEN	BLACK	RED	GRAY





Cut on dotted line

CARD # 2

RED	BLUE	GREEN	BLUE	BLACK
YELLOW	GREEN	ORANGE	GREEN	RED
PINK	BLACK	BROWN	YELLOW	GRAY
BLUE	RED	GREEN	PINK	BROWN
ORANGE	BLACK	BLUE	GREEN	RED

Stroop Test Explanation

Why?

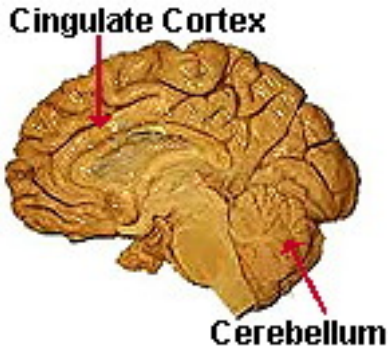
The words themselves have a strong influence over your ability to say the color. The interference between the different information (what the words say and the color of the words) your brain receives causes a problem. There are two theories that may explain the Stroop effect:

1. Speed of Processing Theory: the interference occurs because words are read faster than colors are named.

2. Selective Attention Theory: the interference occurs because naming colors requires more attention than reading words.

I think that this puzzle would be easier for a very young child than for older children or adults. Try this out on some small kids who know their colors, but cannot yet read! I would imagine that the children would not get confused by this puzzle because the words would not have any meaning to them.

There is some evidence that the anterior cingulate area is active in people during the Stroop effect.



Repetition/Learning & Memory

Activity: Brain Mazes

Directions

1. Place 1 sheet of paper (2 mazes, easy first) face down in front of every student.

2. Have one person (teacher/aid) watching the clock in front of the room.

3. Instruct the students that once they successfully complete the maze to quickly and quietly put their hand up.

4. The person watching the clock will call out the time (in seconds) that have passed since the start once hands start going up and will progressively continue to call out times as hands rise until all students have finished.

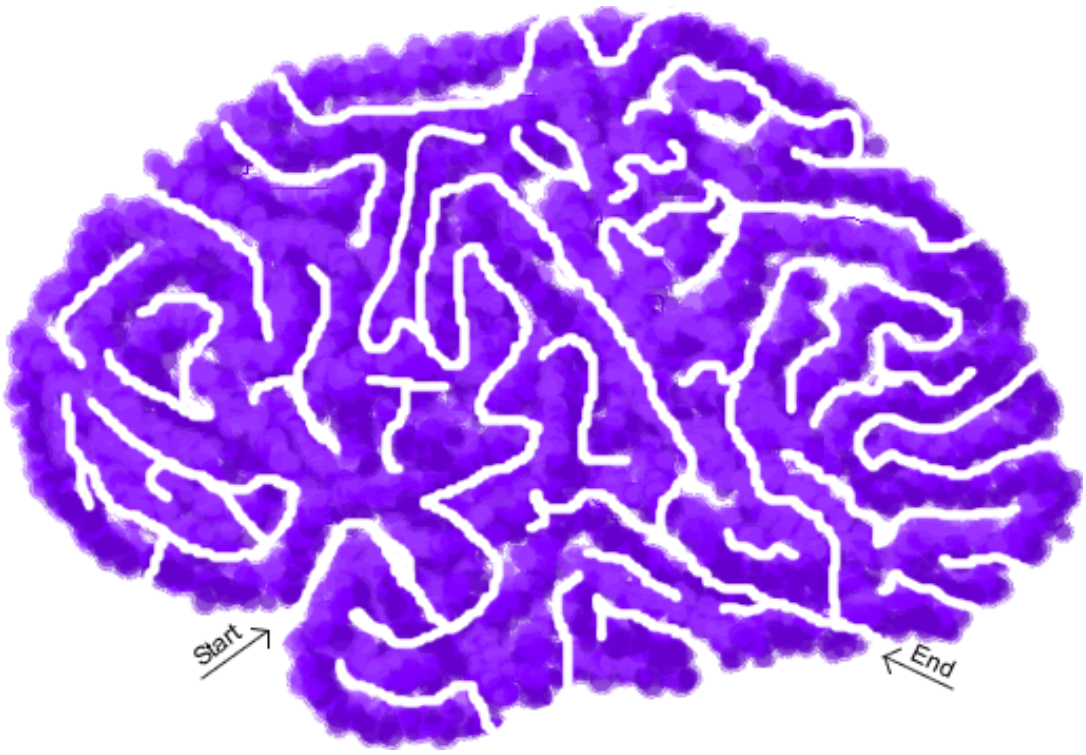
5. Students record their own times underneath the maze.

6. Have all students flip the maze over and begin all at the same time.

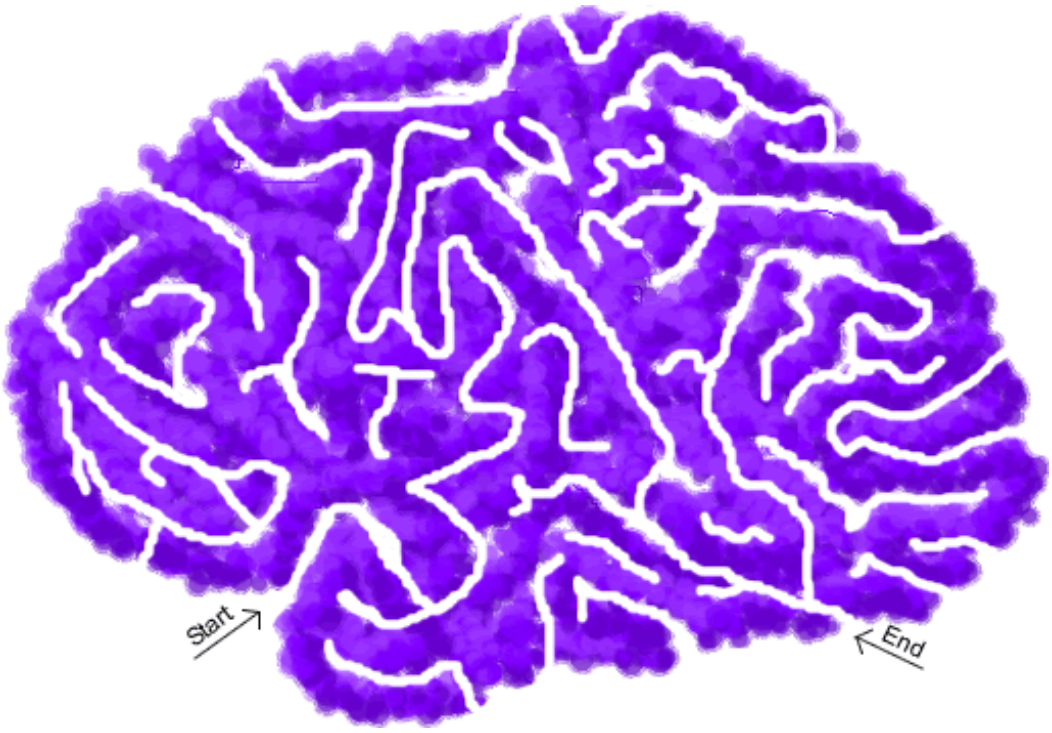
7. Once all students have completed you can:
    a. Immediately have them repeat the same maze at the bottom of the sheet following the same protocol.
        i. Did times get faster? Why is that….repetition, learning.

    b. Pass out the harder maze and repeat the activity as above

Name:_____

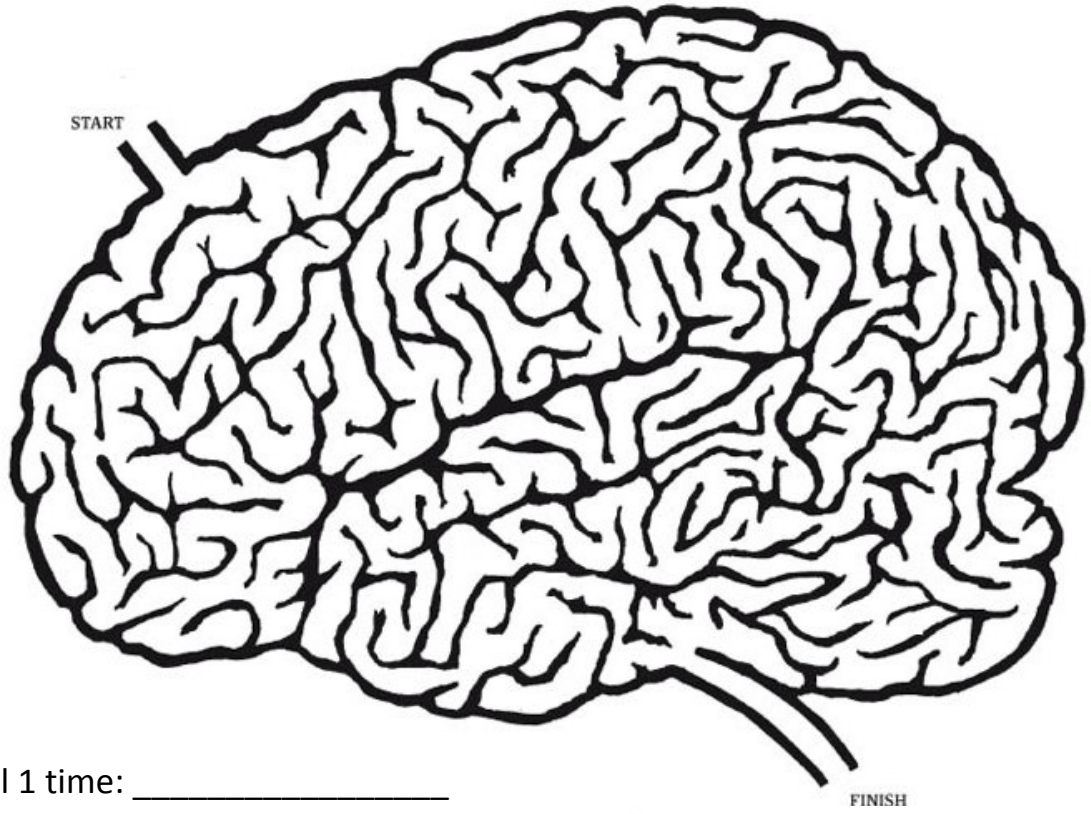


Trial 1 time: _____

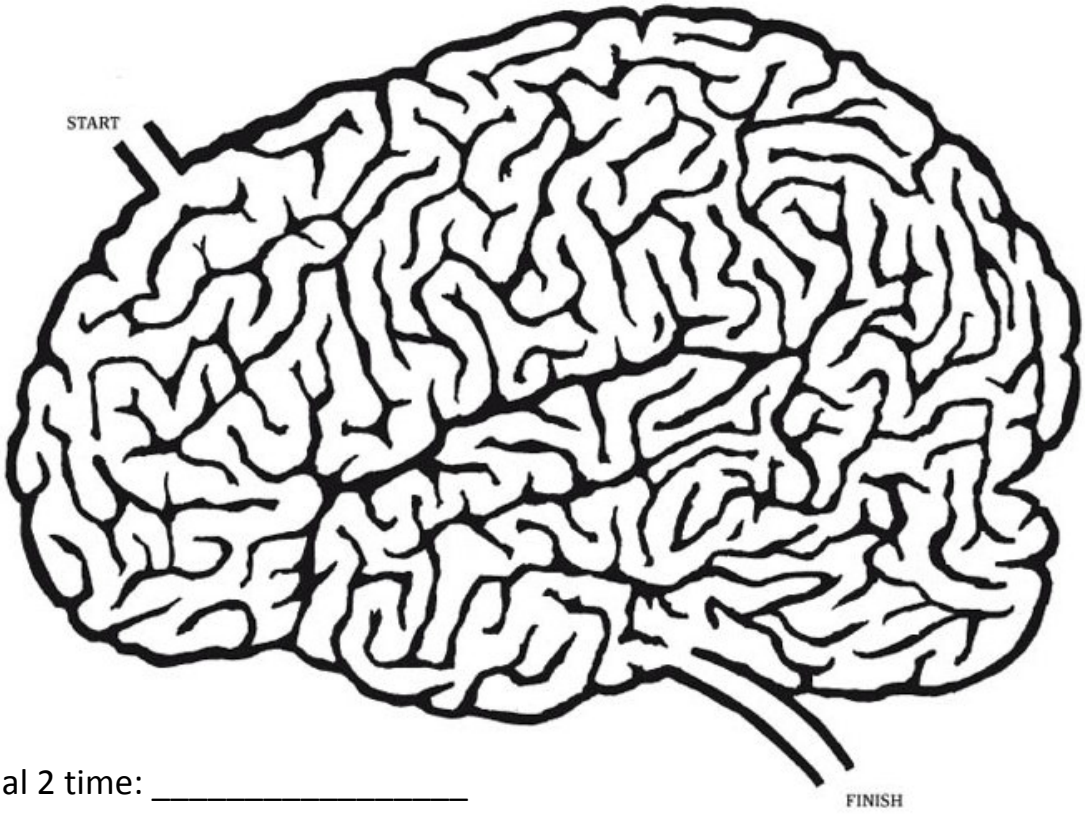


Trial 2 time: _____

Name:_____



Trial 1 time: _____

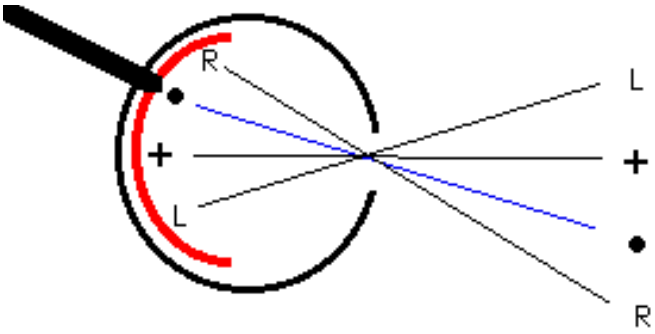


Trial 2 time: _____

Blind Spot Introduction

Most people (even many who work on the brain) assume that what you see is pretty much what your eye sees and reports to your brain. In fact, your brain adds very substantially to the report it gets from your eye, so that a lot of what you see is actually "made up" by the brain.

Some special features of the anatomy of the eyeball make it possible to demonstrate this to yourself. The front of the eye acts like a camera lens, differently directing light rays from each point in space so as to create on the back of the eye a picture of the world. The picture falls on a sheet of photoreceptors (red in the diagram), specialized brain cells (neurons) which are excited by light.



The sheet of photoreceptors is much like a sheet of film at the back of a camera. But it has a hole in it. At one location, called the optic nerve head, processes of neurons collect together and pass as a bundle through the photoreceptor sheet to form the optic nerve (the thick black line extending up and to the left in the diagram), which carries information from the eye to the rest of the brain. At this location, there are no photoreceptors, and hence the brain gets no information from the eye about this particular part of the picture of the world. Because of this, you should have a "blind spot" (actually two, one for each eye), a place pretty much in the middle of what you can see where you can't see.

Look around. Do you see a blind spot anywhere? Maybe the blind spot for one eye is at a different place than the blind spot for the other (this is actually true), so you don't notice it because each eye sees what the other doesn't. **Close one eye and look around again.** Now do you see a blind spot? Hmm. Maybe its just a little TINY blind spot, so small that you (and your brain) just ignore it. Nope, its actually a pretty BIG blind spot, as you'll see if you look at the diagram below and follow the instructions.

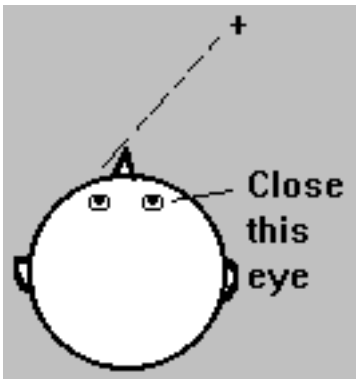
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http://serendip.brynmawr.edu/bb/blindspot1.html

The Eye/Blindspot & Perception

Activity: Blind Spot

Directions



1. Hold the paper about 20 inches away from you (about arms length).
2. Close your RIGHT eye.
3. Stare at the "+" with your LEFT eye.
4. Slowly bring the paper to you.
5. What happens to the "dot"…did it disappear?
    a. What happens if you continue to bring the paper closer…does the "dot" reappear?

Blind Spot Cards

Cut on dotted line



Cut on dotted line



Cut on dotted line



Blind Spot Explanation

At a particular distance (probably a foot or so), the “dot” will disappear (it will reappear again if you move even closer).

The spot disappears because it falls on the optic nerve head, the hole in the photoreceptor sheet.

So, as you can see, you have a pretty big blind spot, at least as big as the spot in the diagram. What's particularly interesting though is that you don't SEE it.

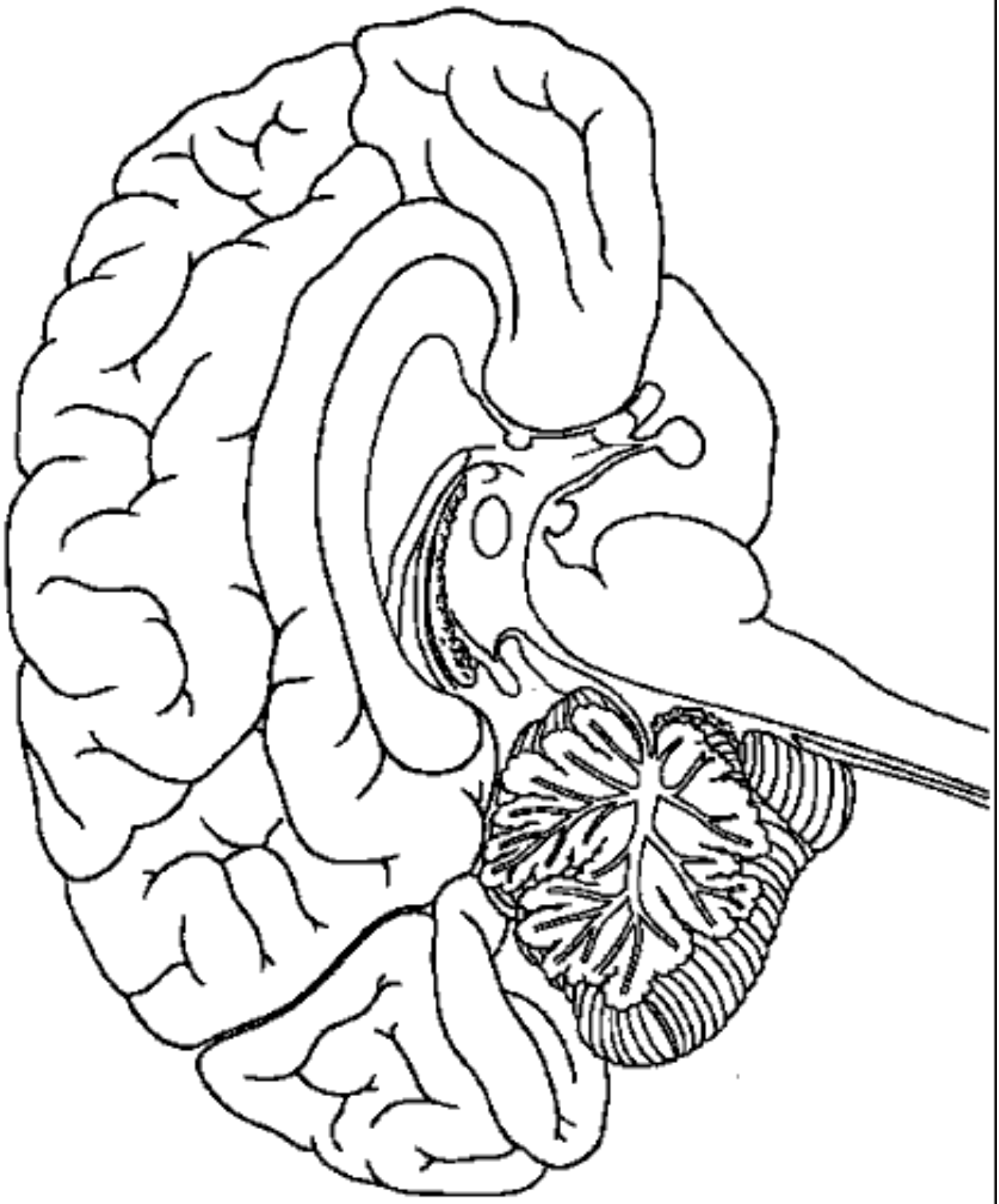
When the spot disappears you still don't SEE a hole. What you see instead is a continuous white field (remember not to LOOK at it; if you do you'll see the spot instead). What you see is something the brain is making up, since the eye isn't actually telling the brain anything at all about that particular part of the picture.

FUN FACT!

An octopus does not have a blind spot!



The retina of the octopus is constructed more logically than the mammalian retina. The photoreceptors in the octopus retina are located in the inner portion of the eye and the cells that carry information to the brain are located in the outer portion of the retina. Therefore, the octopus optic nerve does not interrupt any space of retina.



Name: _____

Name: _____

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