

Brain Tricks

Sensation and Perception: An Interactive Exhibit for Brain Awareness Week and Beyond

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Goals

1. To inform and promote enthusiasm about neuroscience to residents of North Carolina, targeting youth
2. To provide fun, structured opportunities for students, faculty and staff at the UNC Bowles Center for Alcohol Studies to practice community engagement

Partnerships

North Carolina Museum of Life and Science provided hands-on lab space and support from museum staff

UNC Bowles Center for Alcohol Studies provided new, brain-centered exhibit staffed by scientist volunteers

Duke University partnered with UNC to recruit volunteers and provide additional activities near the exhibit

Dana Foundation provided Brain Awareness Week supplies (activity books, pencils, brain erasers, stickers)

National Institute of Alcoholism and Alcohol Abuse provided funding through P60 Alcohol Research Center at UNC and brochures on prevention of alcohol abuse

Materials

1. Brains

- Human brain loaned from the UNC School of Medicine Body Donation Program
- Sheep brains from Carolina Biological Supply www.carolina.com
- Rat and mouse brains from research labs (scheduled for euthanasia)
- Brain models from www.amazon.com

2. Sound Illusion/McGurk Effect

- Portable electronic device and headphones such as a laptop or ipad to watch video

3. Smell Illusions/Balloon Stroop

- Balloons
- Pipettes to deliver liquids into balloons
- Sharpie to label balloons
- Liquid scents/extracts

4. Tactile Illusions

- Marbles

5. Perceptual Size-Weight Illusion

- Small and large cardboard boxes
- Brick to add same weight

6. Distortion Goggles and Motor Coordination

- Distortion goggles that simulate various levels of blood alcohol concentration (BAC)
- Bean bag toss

Brain Awareness Week: Brain tricks interactive exhibit

Activity Guides

1. Brains! See and touch a human brain. One volunteer will show the human brain to the visitors. This is a free-flow activity, in which you ask the visitors questions and encourage them to think and explore, rather than just telling facts about the brain.

Example questions: Where do you think the eyes would be? Where do you think this will go (pointing to the brainstem/spinal cord)? We also have a laminated sheet to point out parts of the brain – you can ask visitors to find the optic chiasm.

Let the visitors touch the brain with gloves on with you holding it, but we need to treat it gently. Note that the brain will have been donated by someone who wanted their body to be used for education after they died. We won't know anything about the person (sex, medical history, etc). Finally, introduce the concept that different brain areas are important for controlling the senses (point out parts for vision, hearing, smell) and mention that we will try to see if we can 'trick' your brain with our activities today.

2. Sound Illusions. One-two volunteers will work at this station and use a laptop to view and listen to a video demonstrating the McGurk effect. The McGurk effect shows us how what we see—lip reading—can override what we hear. It's illustrated with a video of a person saying a sound, and then they might switch to another sound, in which you can hear the difference. But guess what? The person only said one word the entire time! Lead visitors through questions: What happens when you close your eyes? Why didn't it seem funny to us that the sound didn't match what we saw when we were watching the video? When would it be useful to be able to hear with our eyesight?

Video link: <https://www.youtube.com/watch?v=PWGeUztTkRA>

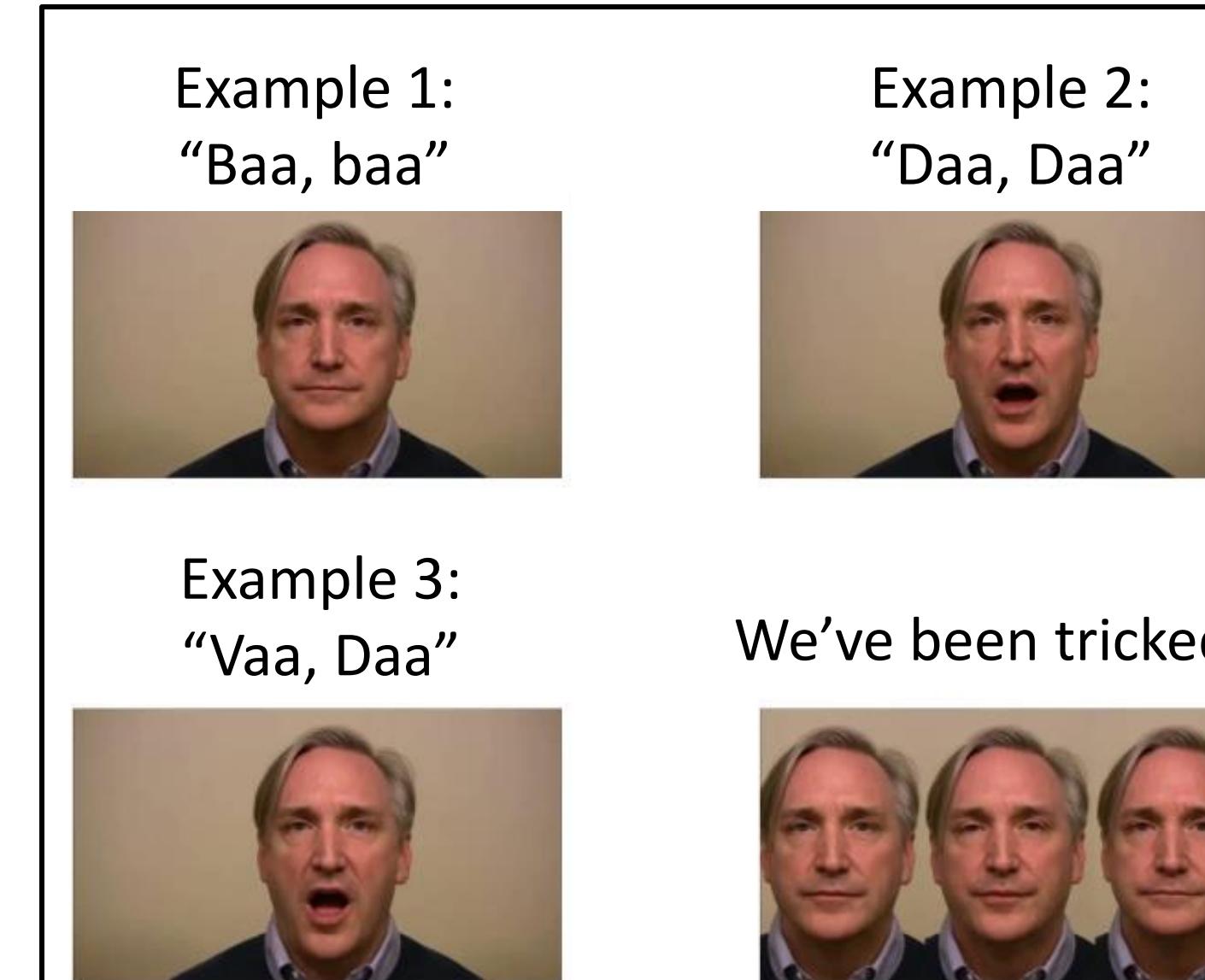
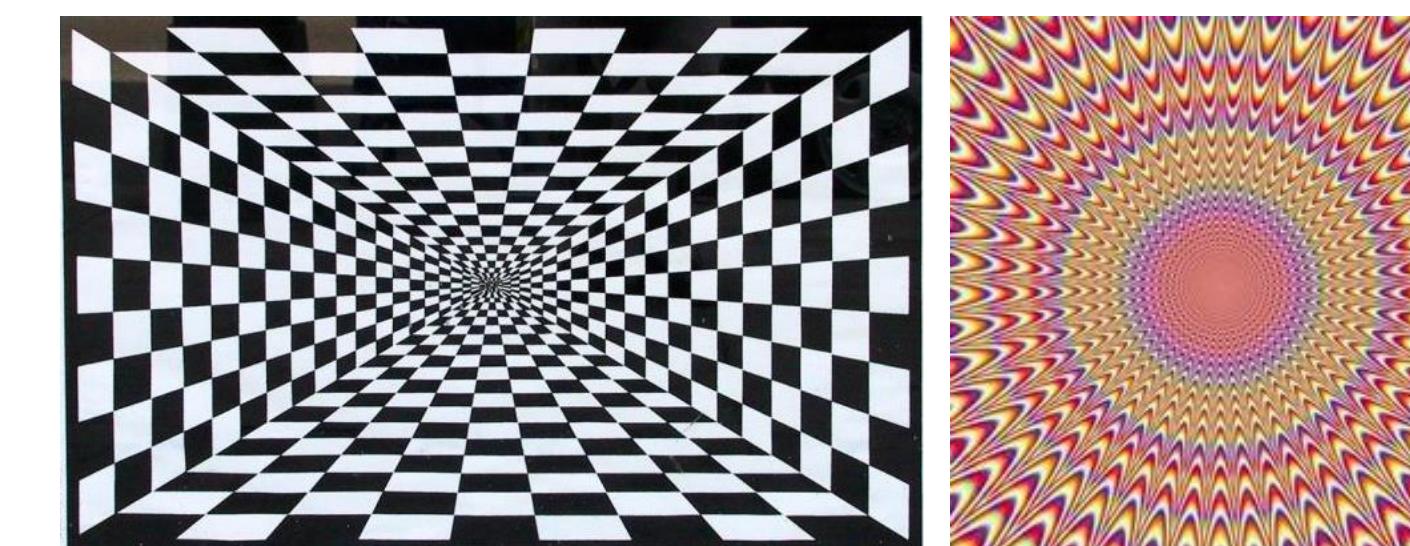
Guides are provided to volunteers to prepare in advance to walk visitors through the activity. Video of instructions and info about the McGurk effect:

<https://www.youtube.com/watch?v=G-IN8vWm3m0>.

3. Smell Illusions. Two volunteers will demonstrate a Stroop-like effect in which color affects what you smell. When you put an extract (e.g. lemon) into a balloon, the odor is able to pass through the latex. Our associations of scents and colors can influence what we think we smell. Participants come up to the station and are asked to tell us what scent they smell. A yellow balloon has been filled with a scent (lemon) and then a second yellow balloon is filled with a different scent (cherry). Most people will identify the first scent correctly as lemon, but they will also say that the second balloon (filled with cherry) also smells like lemon! We then tell them that their brain may have 'tricked' them— we usually identify the smell of lemon with the color yellow. If they identified both scents correctly, we can talk about how their brain didn't get tricked but that some people get the scents incorrect and why this may happen in the brain.

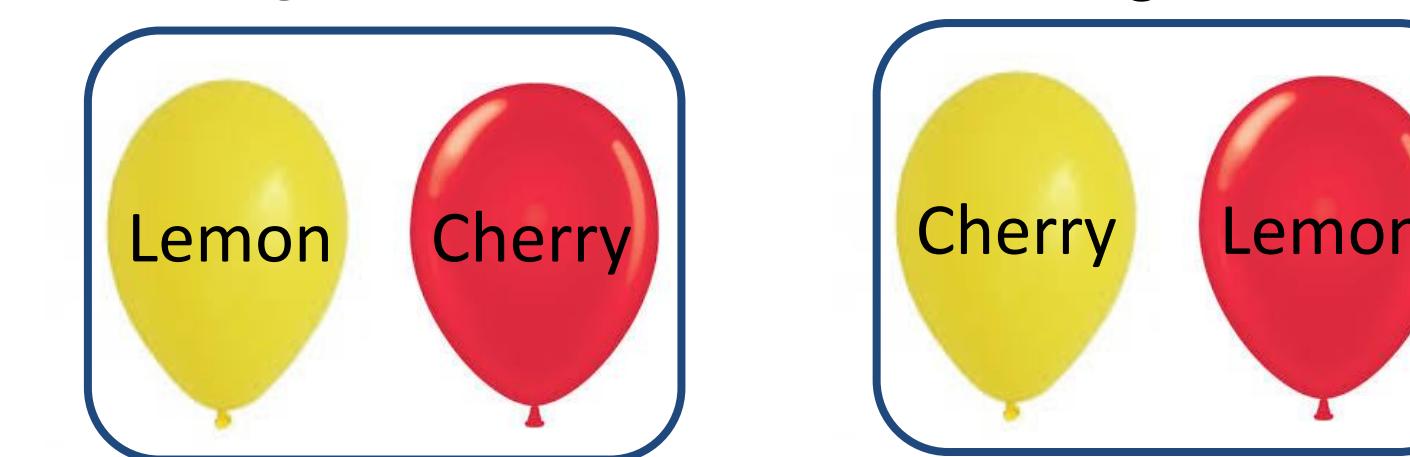
4. Tactile Illusions. The Aristotle illusion occurs when touching a small spherical object, such as a marble, with your fingers crossed. It feels like you are touching two marbles! The 'dead hand' trick results in a mismatch between what is expected and what is experienced. Place your palm against someone else's palm. Using your thumb and index finger, place them on your forefinger and your partner's index finger. If you move your fingers up and down, this may feel odd since your brain expects to feel both sides of your finger, and when this doesn't match your sensation, it's as if you feel a 'dead hand'.

5. Perceptual Size-Weight Illusion. Using two cardboard boxes of different sizes, put a brick in each one and check that they weigh the same. Ask individuals to pick them up and tell you which is heavier. Most people say that the smaller box is heavier, even though it isn't.

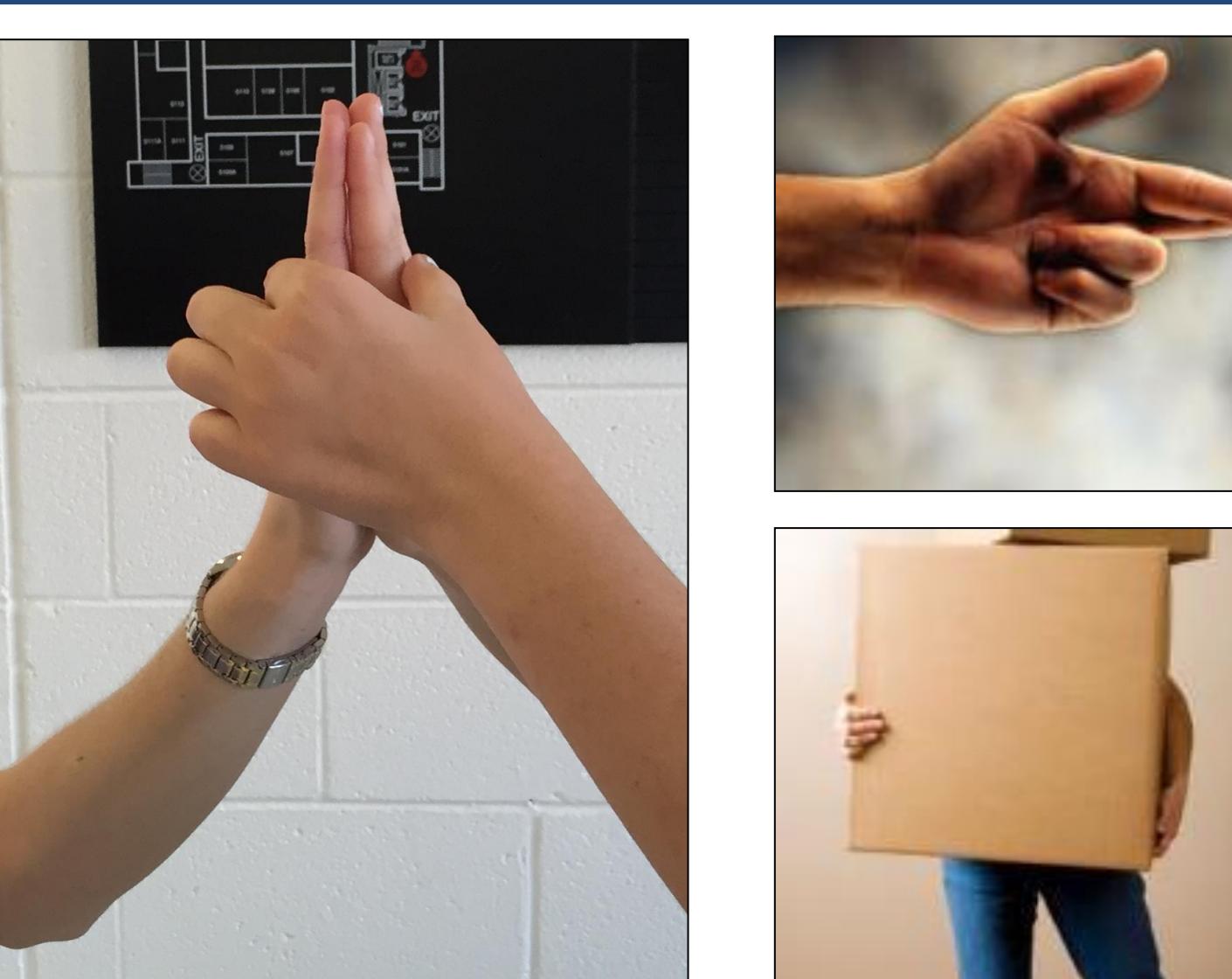
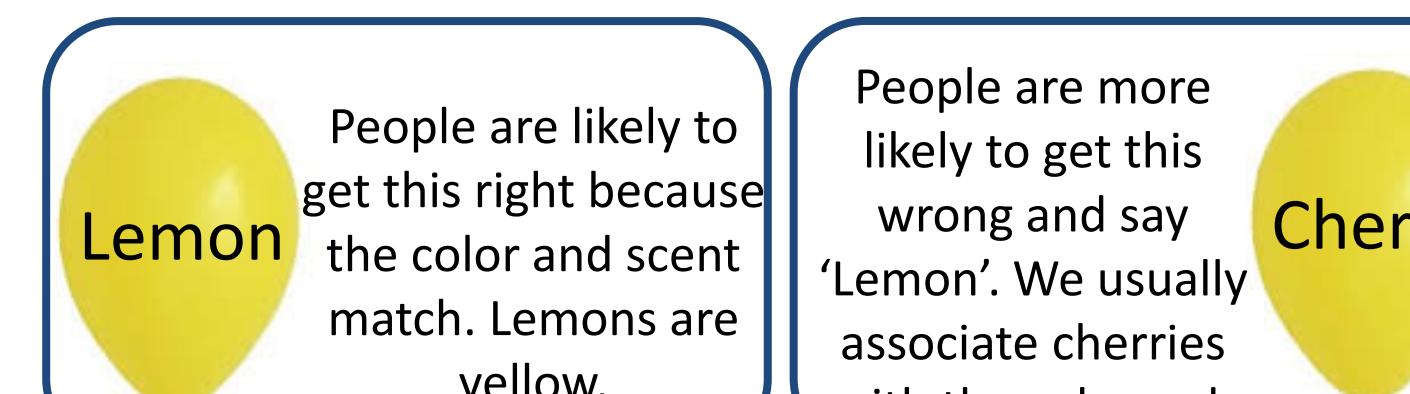


Step 1: Prefill Balloons with scents

Matching Color & Scent Non-Matching Color & Scent



Step 2: Ask 'what do you smell?'



The exhibit- Specifics and Numbers

• Brain Awareness Week

- 40 volunteer scientists from UNC, Duke, NC State and the community
- 760 visitors (548 children, 212 adults)

• Groups of 3-5 children (plus parents) came through the exhibit at a time

• Station 1: Brains

- One scientist showed visitors the brains, asking questions
- What animal do you think this is from? What do you think it will feel like? Is that what you thought it would feel like? Do you think your brain looks like this?

• Station 2: The McGurk Effect

- One scientist worked with 2-3 children (and parents) at a time

• Station 3: Smell Illusions

- One scientist worked with 2-3 children (and parents) at a time

• Feedback

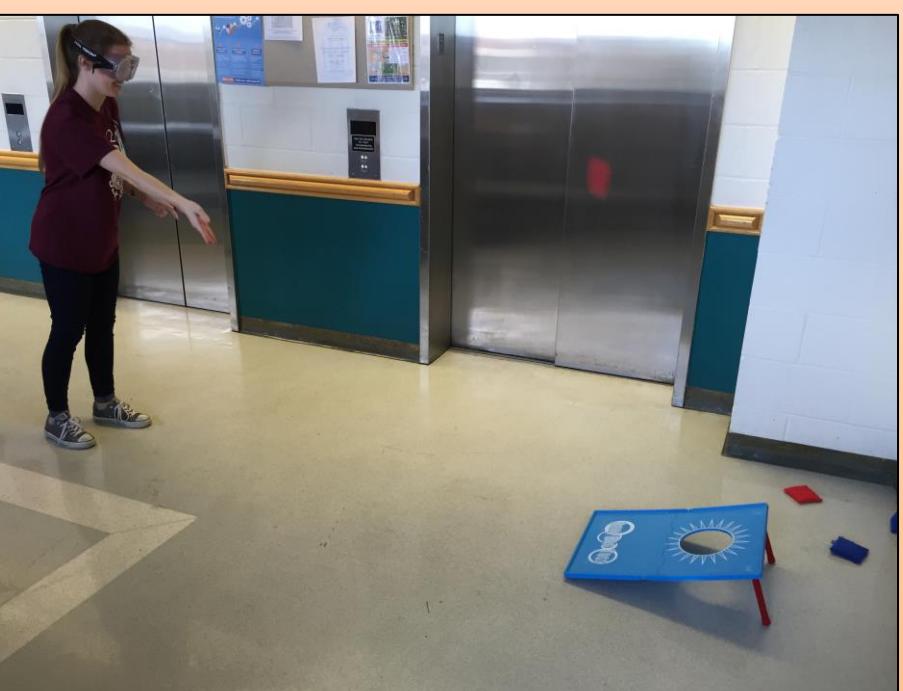
- Visitors wrote what they learned on a poster board and received BAW stickers and pencils



UNC Science Expo

• An outdoor street fair that is part of the NC Science Festival

- Animal brains on one end (no human brain); brains were numbered and visitors guessed the brains' species
- Optical Illusions
- Perceptual Size-Weight Illusion
- Distortion Goggles and Bean Bag Toss
- Goggles mimicking various blood alcohol levels
 - Illustrated the sensory effects of alcohol
 - Hand-eye coordination disrupted



NC Museum of Life + Science

• The Science of Beer

- Adult-only fundraising event
- Promoted drinking in moderation
- BAC awareness

Acknowledgments

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