Sensational Experiential Learning in PSYC 3920: Sensation & Perception

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The class

PSYC 3920 - Sensation and Perception (3 credits)

This class will cover the fundamentals of the sensory world, such as taste, touch, vision, hearing and extrasensory phenomenon. Students in sensation and perception will explore the value of each sense in the perceptual world and will be encouraged to consider what life would be like without each sense. Perceptual illusions will be employed in order to encourage students to delve into the neural underpinnings of sensory perception. Through studying the pathways from sensations to perceptions, students will gain an appreciation of the fragility of perceptions. **Prerequisite:** PSYC 1020 or PSYC 1020H.

The issue: Most students find this course challenging because many concepts covered in class are deceptively simple; students seem to understand the concepts while in lecture, but fail to translate the concepts in their own words during exams or on paper.

Possible solution: Hands on learning.

Demonstrations that work for sensation and perception courses

Leanne Boucher
Psychology Program, Nova Southeastern University, Fort Lauderdale-Davie, FL

The Problem

Most students find their sensation and perception course challenging because many concepts covered in class are deceptively simple; students seem to understand the concepts while in lecture, but fail to translate the concepts in their own words during exams or on paper.

The Proposed Solution

While I don't pretend to have all the answers, I propose here that interactive demonstrations can bring the subject material to life for both students and instructors leading to a more positive learning environment.

Vision

Visual illusions are great teaching tools that show how **normal vision** works through **discovering how vision can be tricked**. Some of my favorite can be found here, along with explanations and references. *Michael Bach's 100 Visual Phenomenon and Optical Illusions:* http://www.michaelbach.de/ot/

Cow eye dissections are a great (and inexpensive) way to show the **anatomy of the eye**. Sheep brains are a great way to show **the visual pathway** (optic nerve, LGN, optic radiations, visual cortex). We get these from Carolina Scientific, (http://www.carolina.com/) but your local butcher may be able to help you out.

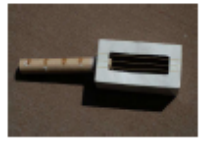
A version of the rotating snake illusion by A. Kitaoka found on the cover of the April 25, 2012 issue of the *Journal of Neuroscience* highlighting work by Otero-Millan, Macknick, & Martinez-Conde.

Eye patches can be used to demonstrate several concepts:

- **Dark adaptation** – have the students wear these all class. At the end, they can compare vision in the 2 eyes.
- **Binocular vision** as a cue to depth – have students cover 1 eye and have them try to catch a ball. Compare to performance with no patch.
- **Visual field** – what parts of the world go to which half of the brain?

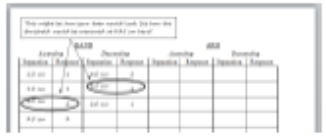
Audition

Making an elastic band guitar can help illustrate the concepts **of resonance, pitch/frequency**, and how when the cochlear loses its elasticity (**presbycusis**), it is the higher frequencies that are not heard.

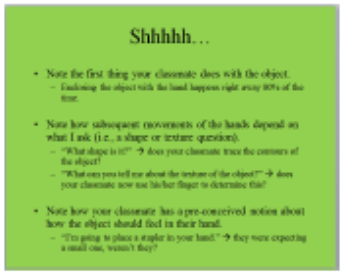


Touch

I use the sense of touch to talk about **Signal Detection Theory** and the **Psychophysics, cortical magnification**, and **receptive fields**. In particular, we measure the two-point threshold on the arm and finger using the Method of Limits to measure ascending and descending thresholds. All you need is a compass and a worksheet:



For a lecture on **haptics**, I have students come to the front of the class and try to guess items I put in their hands. I reveal this slide one line at a time – it's like I'm *magic* because the students do exactly as this slide says!



The author is not affiliated with any company or website mentioned herein.

For more information, email leanne.boucher@nova.edu

Smell

I start my classes with the sense of touch to introduce students to the idea of receptive fields and brain pathways. Smell is the next sense I use to help illustrate the concepts of **specialized areas of the brain** for certain sensory stimuli and the fact that it's the **pattern of brain activity** that influences one's perception of those sensory stimuli. This is a great website that illustrates glomeruli activity both visually and auditorily: http://neuro.uni-konstanz.de/29music/default.html.

Retronasal olfaction can be illustrated by having students guess the flavor of jelly bean while holding their nose.

Taste

To illustrate the concept that one perceives what is being sensed, I use *Miracle Berry* candies which change one's perception of sour to sweet. These can be bought on Amazon and a variety of sour foods work well.

To understand the connection between biology, neurons, culture, and experience, students classify themselves as non-tasters, tasters, and super tasters by counting taste buds and completing an online quiz: http://www.bbc.co.uk/science/humanbody/body/interactives/supertaster/

Poster presented at the 2013 National Institute for the Teaching of Psychology

nitop

Previous year written assignments

- Live with a diminished sense while conducting “experiments”
- Write up experience PLUS draw from peer-reviewed literature to explain experience

Why the change this year?

- My goals:
  - To develop TRUE critical thinkers and SMART consumers of information
  - To demonstrate WHERE to look for validated scientific information
  - To empower students to demand good scientific information from various sources

- For the student:
  - To develop all of the above
  - To create a “take-home” artifact that has real-world applications that is admired by more than just the student and professor

My influences

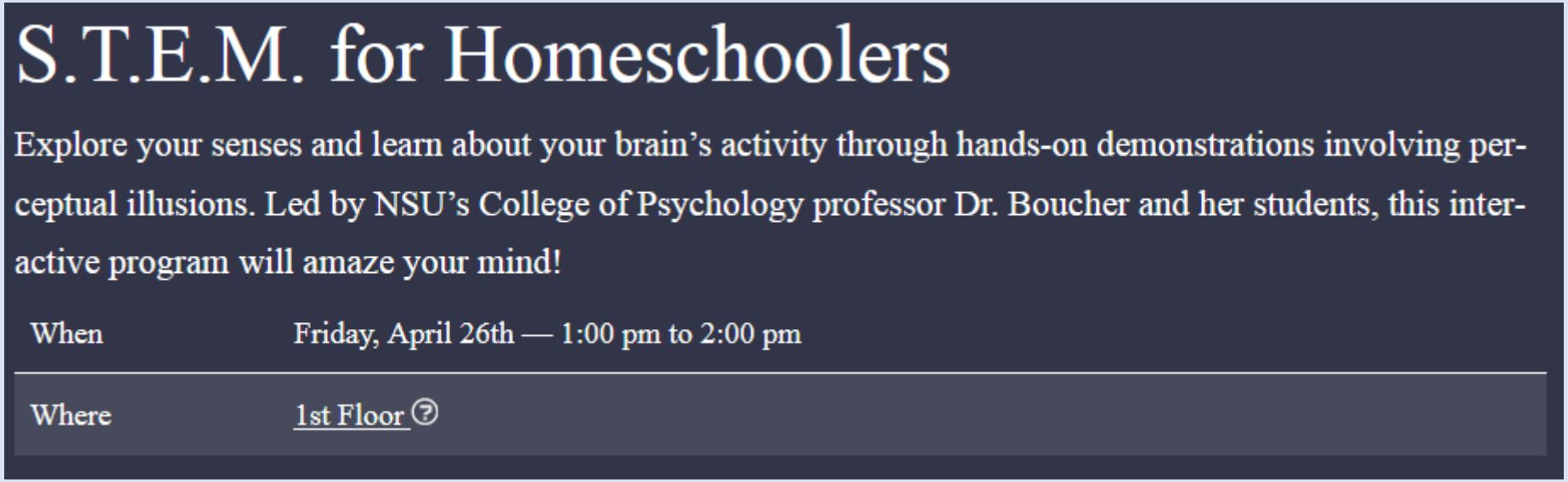
Professional Organizations

Social Media

Nova Southeastern University

The idea

- Instead of writing papers, have students create a project that they can take-away AND give back to the community at the same time.
- Partner with ALVIN SHERMAN LIBRARY and have students present in the S.T.E.M. for Homeschoolers series:



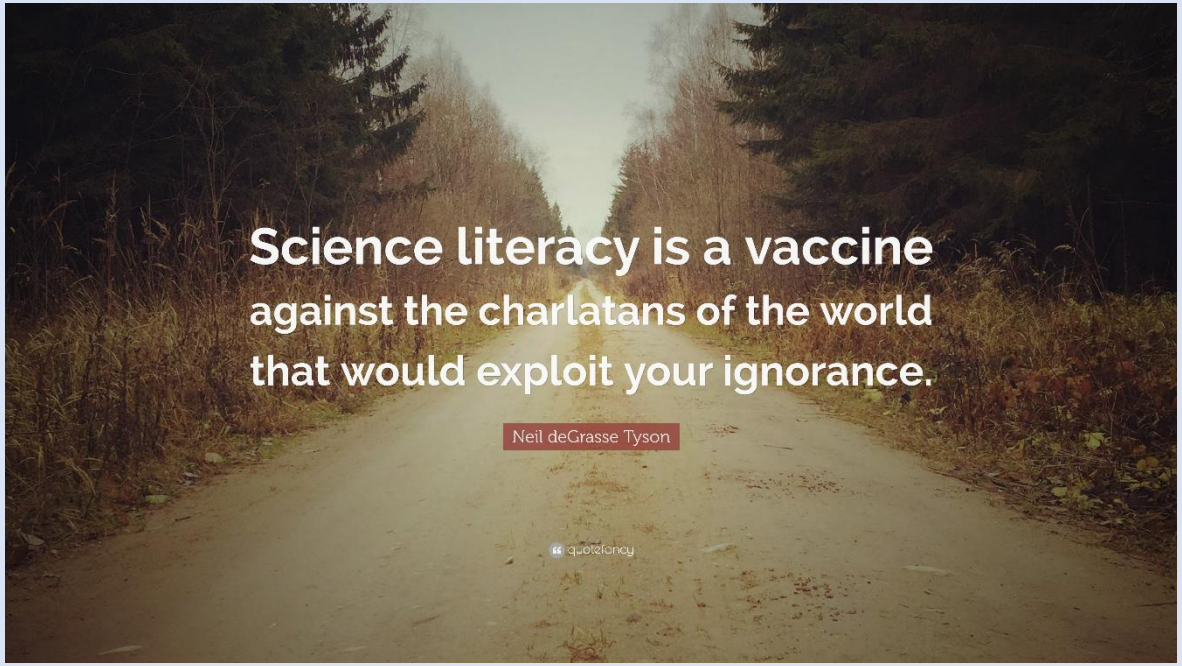
S.T.E.M. for Homeschoolers

Explore your senses and learn about your brain's activity through hands-on demonstrations involving perceptual illusions. Led by NSU's College of Psychology professor Dr. Boucher and her students, this interactive program will amaze your mind!

When	Friday, April 26th — 1:00 pm to 2:00 pm
Where	1st Floor

Science literacy assignment

- 30% of final grade is made up of the following assignments:
  - 10% - visit science exhibits and critique
  - 10% - critique a website, blog, video
  - 10% - create a presentation, complete with a handout, for library program



Science Exhibits instructions

One popular way to educate the public about scientific findings is to create installations in museums or public places that explain complex phenomenon in language accessible to a wide-range of people. Typically, these installations include some sort of hands-on demonstration or exhibit explaining the concept. For this assignment, you will visit an exhibit at the Science Museum and note the following in a 2-3 page paper:

- What concept are they demonstrating?
- How well are they doing at communicating to the public?
- What do you think they did well here?
- What do you think needs work?
- What outstanding questions do you have about the topic portrayed in the exhibit?

Include a picture of the exhibit in your paper.

Museum of Discovery and Science

Saturday, February 2, 2019

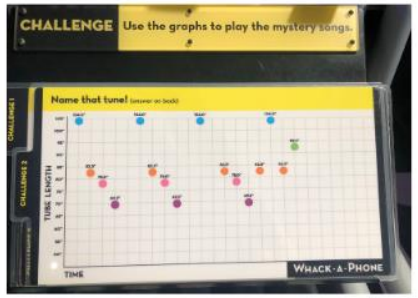
Funding for trip provided by Office of ExEL and College of Psychology – Thanks!

We talked with the Science Outreach Coordinator about careers in science communication and the importance of educating the public about science.

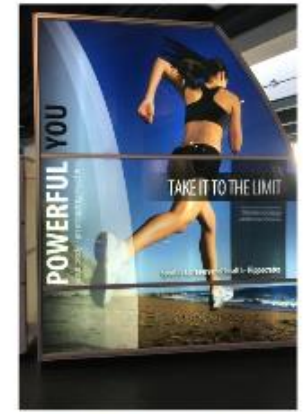
We got a sneak peek before they opened their newest active lab on stomp rockets. This is a hands-on guided demonstration, similar to what the students will be doing at the library.

The Concept

Because of my own particular fascination with music and sound, I was drawn to the exhibits relating to those concepts. The exhibit "Whack-A-Phone" stood out to me because it used and integrative approach of science and sound by having the participant create a familiar tune. The challenge that was displayed on the exhibit was "Use the graph to play the mystery tune".



The Everglades is a unique natural environment that I would love to visit one day. I think this simulated ride was a nice way of getting some idea of what the real-life experience will be like.

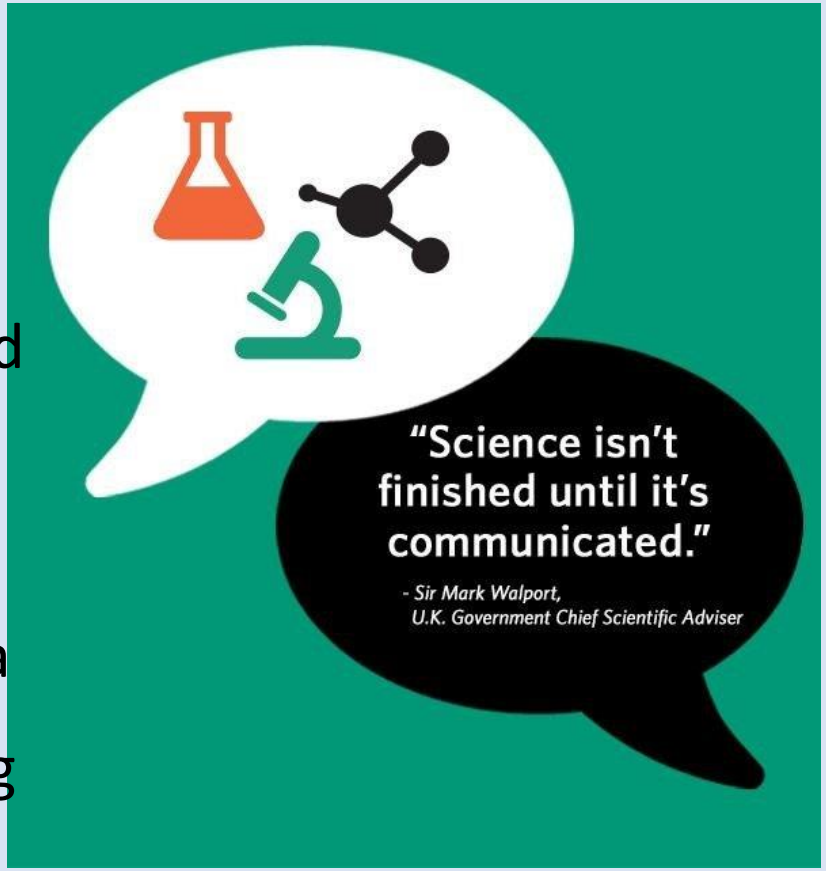


One of the hands-on displays featured is "Fun with Making Waves" (see Appendix A). This exhibition was to show how sound travels through the air. This was demonstrated with a keyboard, each key represented a different frequency, pressing the keys activated beads inside a tube (which was to depict wavelength). The tube was attached to the sound speaker which caused the beads to display different frequency patterns. The keys of the keyboard where labelled in order for an individual to play a tune to activate different patterns of the beads in the tube.

"**I didn't think that I was going to enjoy myself** ..that it was just a museum for children …So with that mindset, I wasn't too pumped to go inside and spend the next hours in a children's museum. **However…I really misjudged the place and actually had a great time** and enjoyed myself and truthfully wanted to stay longer."

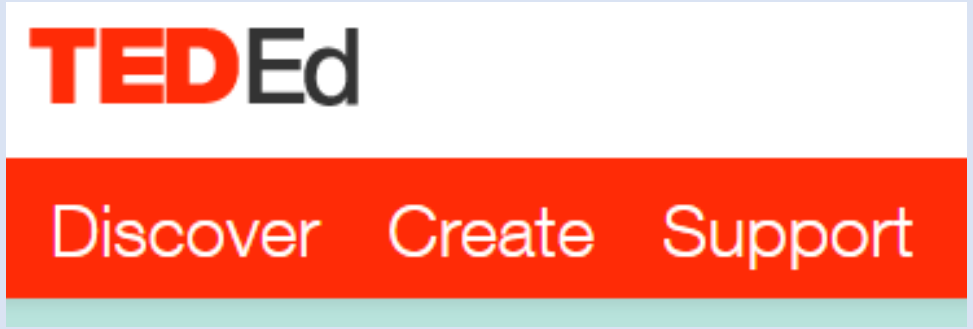
Science News instructions

- **Science Blogs:** Blogs are a great way for people to talk about topics that interest them. Good bloggers will identify interesting questions to pose and then answer them in an interesting and accessible way.
- **Science Videos:** There is a lot of information available in video format for people to learn about new things. For example, YouTube has thousands of videos on topics related to sensation and perception. However, not all the information is portrayed accurately or interestingly.
- **Science Journalism:** When a paper is published in a peer-reviewed journal, it may be hard for the public to gain access to the findings, either because the article is behind a paywall or the article is written in jargon. Scientific articles in journals are written assuming their audience has working knowledge of the field. In order to make the research findings more accessible to the public, science journalism seeks to summarize the article in lay terms.



Science News (related to psychology)

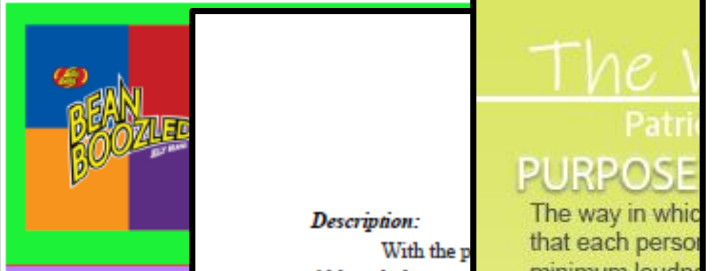
- **TEDEd videos**
  - The fascinating science of phantom limbs
  - Why do we see Illusions?
  - What is Fun About Being Scared?
  - How Do Animals Experience Pain?
- **Psychology Today**
  - The Connection Between Sleep and Pain
  - Why is that your favorite song?
  - The Almost Addicted column
- **Science Daily**
  - Oral contraceptives could impair women's recognition of complex emotions
  - Three types of depression identified



Science Outreach instructions

- One way to truly understand a topic is to try to explain it others. In this assignment, you will create an interactive exhibit (either by yourself or in groups of 2 or 3) to present at the Alvin Sherman Library to a group of homeschoolers on the last day of classes.

- Create one-page handout to go along with interactive demo
  - Introductory paragraph
  - Materials needed
  - Steps in the process
  - Discussion about what happened
  - Website for more information



OVERVIE

EXPERIM

TASTE & S

TASTE & V

Description:

With the p
Although the most
how sound travels
cup-phone, making
talk ... or sing!

Materials Needed:

- Two cups:
- String: ~1
- Two paper
- Scissors
- Markers +

Steps:

1. Choose yo cup/string sound best
2. Poke a sm
3. Cut string the cup to
4. Decorate y
5. Find a frie in between still hear e giving the

What happened?

Sound is p
These collisions tr
needs matter, so it
vibrate, causing th
inside of the cup. T
oscillations reach t

More info

- Longest st https://www
- An article https://www

The V

Patri

PURPOSE

The way in whic
that each perso
minimum loudne
sound present.
letting you turn
Younger people
threshold for so
sounds at the lo
decrease with s
There are a few
our own, withou
swabs to clean
loud music. How
just something t

MATERIA

Headphones, 40
https://www.yout

STEPS

1) The participa
2) A pure tone o turn up the so you can hear
3) As soon as th level will be n
4) The intensity asked to repe that the dial w
5) At the end of perception of

WHAT HA

Noise-induced h
or last too long.
allow you to hea
relevant topic to
able to hear, and

WANT MO

1) Dangerous De http://dan
2) Noise-Induced https://ww

Description: Here is an e

try to identify the mystery

How difficult was it?

Materials Needed:

- Hands
- Pencil
- Blindfold
- Mystery items lik balls or a toy
- Box

Steps:

1. Close eyes or us
2. Reach inside the mystery item
3. Identify the objec
4. Write it down

What Happened?

We can recognize objects
when our other senses are
limitations. There are hand
closing your hand to feel t

Want more information?

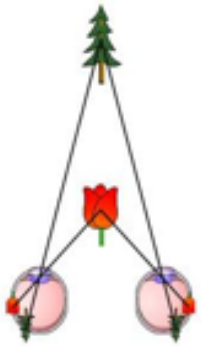
- http://faculty.wash
- https://www.plasti

Gabrielle Magnus, Aimee Ber

O

Have you ever wondered wha
How difficult would it be for
You have two, so what happe
you still be able to do everyth

Our experiment is called "Cap
how using two eyes is better t
eyes, it is easy to be able to te
judgement of distance is know
difficult to tell how close an o
your depth perception is wher



Instructions:

1. Put a c or her.
2. Ask yo
3. Hold o around slowl
4. Tell yo "Drop it!" Th the penny is
5. Try this cup is with tw

Materials:

- Five pennies
- Small plastic or paper
- A table where you and

Conclusion: After the experim
that when one of your senses
your ability to do simple tasks
for the sense that was lost.

Additional websites:
https://www.sciencelearn.org.
https://www.kiwico.com/diy/

SMELL AND TASTE

How are smell and taste related?

Maria Jose Sanchez & Maria Jose Reyes

Fun Facts:

- Did you know that we can attach a specific smell with a specific memory?
- You taste with your brain.
- As you grow older, your sense of smell tends to get worse.
- People can detect at least one trillion distinct scents.
- You can smell fear and disgust.
- Eating sweet food helps form a memory of a meal.
- Smell is the oldest sense.
- Woman have better sense of smell than men.
- Dogs have nearly 44 times more scent cells than humans.
- Your tongue can get fat.
- Each human has their own distinct odor.

Smell and taste work together

It is only with the help of smell that we are able to distinguish the different tastes in food.

Experiment

In this experiment we will demonstrate how smell has a great impact in our taste.

1. First we need 4 volunteers.
2. All volunteers will cover their eyes
3. 2 of them will also cover their nose, while the other 2 will be able to smell their food (jellybeans, red and green apple)
4. We will give them different foods (jellybeans, red and green apple) and they'll have to guess what it is. (Please don't say the name of the food out loud)
5. Who guess it first? The ones with their nose covered or the ones that were able to smell it?

For more info:

http://www.brainfacts.org/Thinking-Sensing-and-Behaving/Taste/2012/Taste-and-Smell
https://www.nia.nih.gov/health/smell-and-taste

Not done yet!

- Students seem to like it, but there has been no formal assessment yet as it’s on going.

- Possible changes for next year:
  - Have students critique each other’s critiques
  - Narrow down some of the choices for the assignments

Thank you!

- Office of Experiential Education
- Department of Psychology and Neuroscience in the College of Psychology