

2 Day Lesson Plan: Visual Sensation Stations

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Goals and Objectives	<ul style="list-style-type: none"> Students will gain an understanding of concepts and ideas related to thresholds and the senses in their own words Students will demonstrate multiple concepts in sensation through labs and activities and relate concepts learned to those activities Students will be able to apply the science practices of psychology to content and demonstrations on the senses Students will be able to use their knowledge of sensation to predict differences in perception Students will be able to use their knowledge of sensation on applicable assessments in multiple choice and written form
APA National Standards	<p><u>Integrative Themes:</u></p> <ul style="list-style-type: none"> Psychological science relies on empirical evidence and adapts as new data develop. Psychological, biological, social, and cultural factors influence behavior and mental processes. Psychology values diversity, promotes equity, and fosters inclusion in pursuit of a more just society. Our perceptions and biases filter our experiences of the world through an imperfect personal lens. Applying psychological principles can change our lives, organizations, and communities in positive ways. <p><u>Scientific Inquiry and Research Methods:</u></p> <ul style="list-style-type: none"> Research methods and measurements used to study behavior and mental processes Basic concepts of data analysis <p><u>Content Standards</u></p> <p>Standard Area: Sensation</p> <ul style="list-style-type: none"> Content Standard 1: The function of sensory systems <ul style="list-style-type: none"> 1.1: Explain the basic concepts of psychophysics such as threshold and adaptation Content Standard 2: The capabilities and limitations of sensory processes <ul style="list-style-type: none"> 2.2: Describe the visual and sensory system <p>Standard Area: Perception</p> <ul style="list-style-type: none"> We will not focus on a singular standard here but rather predicting perceptual differences as a precursor to introducing perception <div style="border: 1px solid black; padding: 10px; margin-top: 10px;"> <p><u>Explanation of National Standards Use:</u></p> <ul style="list-style-type: none"> <u>Integrative Themes:</u> <ul style="list-style-type: none"> This lesson uses connections to empirical evidence from studies and concepts discussed in class as well as has students examining their own data to connect. This lesson also contains elements of how biology and group behavior intertwine to affect behavior and mental processes when examining how thresholds are impacted by the environment. When students examine the McGurk effect it is important for them to understand that diversity in humans may cause them to experience this effect differently. Students discuss this while examining the world through a lens other than their own and how these lenses can alter our society. <u>Scientific Inquiry and Research Methods:</u> <ul style="list-style-type: none"> Students are utilizing their understanding of the research methods and data in multiple demonstrations throughout this lesson and applying that knowledge to writing about the research methods and data use 1.1: Explain the basic concept of psychophysics such as the threshold and adaptation <ul style="list-style-type: none"> Students are demonstrating the thresholds of absolute and difference in the metronome and paper weight activity. They then have to explain how these activities relate to the terminology after they experience it first hand. 2.2: Describe the visual and sensory system: Students complete their brain dump and metacognition on the content of the visual system but in turn are utilizing that information for activities and demonstrations that in turn should lead them to be able to understand the idea of visual capture as well as the anatomy of the eye in its relation to color and black and white vision. </div>

Advanced Placement Course Exam Description Standards	<p>Science Practices:</p> <ul style="list-style-type: none"> • 1.A.3: Draw logical conclusions about behavior and mental processes • 1.B.1: Explain how cultural norms, expectations and circumstances apply to a scenario • 2.A: Determine the type of research design used in a given study • 3: Identify and calculate representations of psychological concepts in qualitative and quantitative research, including tables, graphs, charts, figures, and diagrams • 4: Develop and justify psychological arguments using evidence <p>Topic</p> <ul style="list-style-type: none"> • 1.6 Sensation <ul style="list-style-type: none"> ◦ 1.6.A: Explain how the process of sensation is related to behavior and mental processes ◦ 1.6.B: Explain how the structures and functions of the visual sensory system relate to behavior and mental processes
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Unit: Sensation

Timing: 2-90 minute blocks

Classroom Note: students sit in groups of 4. They work with these groups as they answer questions, talk out content, and complete labs and demonstrations.

Topics and Learning Targets:

- Students will be applying concepts, ideas, and theories related to sensation of vision to real life as well as labs activities and demonstrations

Skills:

- Application to human behavior and mental processes
- Application and interpretation of scientific research and data
- Prediction related to perpetual effects of sensory information

Prior To Class:

- Students will already have completed lessons on anatomy related to the senses.
- Students have completed a screencast assignment. This screencast contains the base information and notes related to thresholds and the senses. The goal of notes taken from readings or screencasts is to have the base information written down for reference and clarification
- Students will have had lecture/clarification of content related to senses and thresholds

Anticipatory Set Day 1:

- Retrieval Practice Formative Assessment (10 minutes)
 - Students:
 - Students will start class with a retrieval practice activity. They will be given a sheet of paper with the vocabulary and learning targets for the vocabulary. They will start in a blue or black ink pen or pencil and write as much as they can remember about definitions and application of the sense of vision and introductory sensation content. Once they have exhausted their internal knowledge they will switch to a red marker and use their notes as well as their table mates to try to fill in gaps.

- Teacher:
 - I will walk around the room noting common gaps in memory by examining common red elements. I will also collect the sheets to look for gaps in items that have not made it to the page to make sure to review and reteach

Detailed Lesson Plan Day 1

- Students will be completing a variety of stations with activities, demonstrations, labs, and data collection. They will rotate through these stations. While students rotate through stations the teacher will move through the room to examine work and answer questions and expand thinking. Each station takes about ten minutes.
- Station 1: Absolute Threshold (10 minutes)
 - Students will take the hall pass and go in the hall with their group. They will utilize an online metronome site: https://www.youtube.com/watch?v=DwAHQ_AZ73w
 - Students will turn the metronome volume on their chromebook $\frac{1}{4}$ of the way up.
 - Students will stand with their left ear facing the chromebook and walk sideways away from the chromebook. When they get to the state where they can no longer hear it, they will examine how far away they were able to get and answer the questions on their stations sheet (see attached student documents)
- Station 2: Just Noticeable Difference (10 minutes)
 - Students will pair up in their groups and grab a stack of printer paper with 500 sheets of paper in it. They can number off by 4
 - Students will take turns
 - One student holds the paper in their palms with outstretched hands and their eyes closed while the other student removes one sheet at a time
 - The student holding the paper lets the other student know when they can tell the weight has changed.
 - When everyone has gone students will record their data, answer the questions in their stations sheet and calculate the data asked for.
- Station 3: Sensory Interaction (10 minutes)
 - Students will reach into a bag of starbursts.
 - It is important that they do not see the color of their starburst.
 - They will unwrap their starburst under the table so they do not see the color
 - They will plug their nose and close their eyes
 - They will place the starburst in their mouth and chew for ten seconds with nose plugged and eyes closed
 - After ten seconds students will take a deep breath and keep chewing
 - Students will then answer the questions in their stations sheet.
- Station 4: Balance Activity and McGurk Effect (10 minutes)
 - Students will stand behind their chairs and keep their hands just above their chair so they can grab on if they lose their balance
 - Students will balance on their right leg for ten seconds, then their left leg for ten seconds
 - Students will then close their eyes and try to balance on each leg again for ten seconds
 - Students will answer the questions in their stations sheet before moving on to the McGurk Effect
 - Students will view a video on the McGurk Effect: <https://www.youtube.com/watch?v=2k8fHR9jKVM>
 - Students will answer the questions in their stations sheet
- Station 5: The Mirror Box (10 minutes)
 - Students will go to the table with the mirror box (picture attached under sources)

- Students will put one hand in the box and one hand on the outside with the mirror
- Students will focus on the mirror and acclimate their hands to the box
- After 30 seconds students will pull the inside hand out of the box while looking at the mirror
- Students will answer the questions in their stations sheet

Students will return to their table group desks for a culminating activity (30 minutes)

- **Formative Assessment Culminating Activity:** critical writing practice utilizing science practices in psychology
 - Students will be given a packet containing a very modified version of an Advanced Placement Evidence Based Question (EBQ)
 - Instead of using full sources students will utilize knowledge from the day's station activities, demonstrations, and data they collected to complete the EBQ
 - Students will be given a prompt (see student documents) to make a claim and answer all parts of the question with their table group
 - Students will complete this using a 2 color strategy similar to what they used in their beginning of class brain dump. This will allow the teacher to collect them and see areas of struggle.

Anticipatory Set Day 2:

- **Claim and Evidence Practice (10 minutes):**
 - Prior to class I will have reviewed their work on their writing and claims from the previous class
 - Students will be given a document or google slide with the claims that have been made by students from all groups.
 - Underneath each claim will be the evidence from the stations as well as the psychology term that students chose and explained
 - Students will review each of them with their table mates to look for alignment with the rubric and discuss whether the points would have scores

Detailed Lesson Plan Day 2

- Students will be focused on rod and cone activity today. Throughout the block they will be implementing, gathering data, calculating data, drawing conclusions about their data, and practicing like they will be tested.
- **Peripheral and Central Vision Study (70 minutes)**
 - Students will work with their table groups to implement a study that utilizes a rod and cone testing device (see attached picture) to gather and examine data on capabilities of vision from differing angles from the face
- **MCQ practice(20 minutes)**
 - Students will work on an example of a multiple choice question alone using elimination strategies and metacognition
 - Once their group has finished working alone students will compare their elimination and metacognition and decide as a group on a final answer
 - We will then go over the question as a whole class discussing elimination and metacognition
 - Teacher will collect to examine data on student progress as a formative assessment

Formative and Summative Assessment

- Retrieval practice (see student documents)
- EBQ sensory interaction (see student documents)
- AAQ/EBQ combined on central and peripheral vision (see student documents)
- Multiple Choice Practice (see student documents)

Student Documents:

Day 1

Retrieval Practice Brain Dump

Directions:

- Use your vocabulary and objectives from last class's content on sensation and vision
- Start by defining as many words as you can and relating it to as many learning objectives as you can. Use a regular writing utensil
- When you can do no more from memory then switch to a color marker (red preferably) to use your notes and your table mates to fill in gaps
- After ten minutes we will move on

Define	Explain the relationship of these concepts to behavior and mental processes
Sensation	
Perception	
Absolute threshold	
Just noticeable difference	
Sensory adaptation	
Weber's law	
Sensory interaction	
synesthesia	
retina	
photosensitivity	
transduction	
Blind spot	
lens	
accommodation	
nearsightedness	
farsightedness	
rods	

cones	
Trichromatic theory	
Opponent process theory	
Photoreceptor cells	
fovea	
afterimages	
Ganglion cells	
dichromatism	
monochromatism	
Prosopagnosia (face blindness)	
blindsight	

Quickly summarize the metacognitive chart below based on your brain dump retrieval practice”

Know it!	Can define but not apply	Cannot do either task

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Sensation Stations

Station 1: Absolute Threshold

- Grab your Melone hall pass
- Find a quiet place with a long hallway.
- Open the youtube link with the metronome
(https://www.youtube.com/watch?v=DwAHQ_AZ73w)
- Turn the volume button on the youtube video to $\frac{1}{4}$ of the way up
- Place your chromebook on the ground facing you
- Stand with your left ear facing the chromebook
- Walk sideways away from the chromebook
- Move slowly to try to determine how far you get before you stop hearing the sound

Write to your April self:

Describe the activity and how it demonstrates absolute threshold:

Is this your true absolute threshold? If yes, defend your choice. If no, explain the factors that get in the way:

Station 2: Just Noticeable Difference

- In our classroom
- Grab a stack of printer paper (500 pieces)
- Repeat for each person in your group
 - Have the person close their eyes and set the paper on their hands
 - Have a partner start removing pieces of paper 1 by 1
 - Person holding the paper will alert the paper remover when they can feel a difference in weight. Record how many pieces of paper needed to be removed prior to feeling a difference

Person 1	
Person 2	
Person 3	
Person 4	

Write to your April Self:

How does this demonstrate the just noticeable difference?

How does this demonstrate Weber's law?

Calculate the following stats for your data group

mean	
median	
mode	
range	

Station 3: Sensory Interaction

- In our classroom
- Take a starburst from the bag without looking at the color
- Unwrap it under a table so you do not see the color
- Plug your nose and close your eyes
 - Chew the starburst with the above qualifications for 10 seconds
 - Then unplug your nose and open your eyes and keep chewing

Write to your April self:

How does this demonstrate sensory interaction?

How might the effect change if you saw the color?

What does this say about the interaction of taste and smell versus the interaction of vision and taste?

Station 4: Balance and McGurk Effect

- In our classroom
- Find a spot near a chair you can hang on to (I do not want anyone falling over)
- Balance on one leg
- Balance on the other leg
- Balance again on one foot and try closing your eyes and continuing to balance

Write to your April self:

What happens to your balance when you close your eyes

What does this tell you about the importance of vision for your sense of balance?

- Examine the video on the [MCgurk Effect](#):

Write to your April self:

Summarize the effect that vision has on interpretation of sound

How might this affect be similar or different for someone who is differently abled in their hearing ability?

Station 5: The Mirror Box

- Go to the table with the mirror box
- Make sure the mirror is facing to the right and that you are standing in front of the opening to the box
- Take turns doing the following:
 - Stand in front of the box
 - Put your left hand in the box and your right hand outside the box
 - Complete the hand orientation task I demonstrated for you while looking at your hand in the mirror
 - After orienting for about 30 seconds continue to look at the mirror but pull your left hand out the box as quickly as possible



Write to your April self:

How does vision affect your sense of movement and touch?

Think back to our content on neurological pain in amputees and phantom limb. How might this be used as a treatment?

Writing Practice/The Science Practices: Sensory Interaction

- Now that you have completed your stations, complete the writing practice below. It is a formative assessment addressing your argumentation skills as well as your use of content from today's stations
- Instead of using 3 studies as sources you will use your learning from today's stations

Make a claim related to the prompt below:

Describe the importance of vision when utilizing more than one sense at a time

A- Make a claim related to the prompt

Bi- Back up your claim with evidence from the stations today

Bi- Defend your evidence with a term from content on sensation and vision

Ci- Back up your claim with a different piece of evidence from the stations today

Cii- Defend your evidence with a different term from content on sensation and vision

Day 2

Bell Ringer- Would You Score It

- I am going to give a sample of the writing exercise you completed at the end of class yesterday
- Read it and then use the rubric below to determine whether you would score it
- Let's discuss:

	Answer	Rubric	YesNo: Why
Claim	Vision overrides other senses when we are using more than one sense at a time	Responses that earn 1 point: <ul style="list-style-type: none">• The response proposes a claim that suggests a positive or negative effect on the question.• The response proposes a recommendation for the application of the question.• The response proposes a specific effect on the question.	
Source Evidence	When we balanced on one foot with the use of our vision we had better balance than with our eyes closed.	specific evidence relevant to the claim.	

Psych Concept	One term that applies is the cerebellum. While the cerebellum allows for balance it would also need the use of visual information to work at its best.	<ul style="list-style-type: none"> The response correctly interprets the evidence and applies a psychological perspective, theory, concept, or research finding correctly. 	
Source Evidence	When we chewed the starburst with our nose plugged we struggled to identify the flavor	specific evidence relevant to the claim.	
Psych Concept	Since the thalamus is all senses except smell then without smelling we can't identify flavor	<ul style="list-style-type: none"> The response correctly interprets the evidence and applies a psychological perspective, theory, concept, or research finding correctly. 	

Peripheral Vision Test

Directions:

- Today you will be working with your table group to examine the difference between your central vision and your peripheral vision
- You will be using our protractor style tool pictured below with a partner



- Person 1: will sit with the protractor tool placed under the chin and around the neck. You will make sure to focus straight ahead on something across the room. You will not use your peripheral vision at all
- Person 2: you will stand behind your partner and complete a variety of tasks
 - Task 1: Take a dark color marker that is not black or grey. Place it perpendicular to the protractor and slowly start to move it one inch at a time closer to the center. Record the movement in inches before your partner could tell you the correct color
 - Task 2: Repeat this for a light colored marker that is not black or grey
 - Task 3: Take a card with a black and white shape on it and complete the same process as you did with the markers. This time your partner will alert you when they can tell that there was movement AND when they can tell you what the shape is on the paper

Data Collection:

	Personal Data	Table Partner 1	Table Partner 2	Table Partner 3
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Dark Color Marker Distance in Inches				
Light Colored Marker Distance in Inches				
Movement Distance in Inches				
Shape Distance in Inches				

Data Analysis:

	Mean
Dark Color Marker Distance	
Light Color Marker Distance	
Movement Distance	
Shape Distance	

Data Conclusion:

Identify and defend the research method used in this study:

State the operational definition of the distance in this study:

Discuss what the difference in the means for the dark color marker versus movement can help us conclude about our study:

Explain how the findings of our study support or refute localization of rods and cones in the anatomy of the eye:

Use the results of our study to make a claim about localization of rods and cones in the eye and their impact

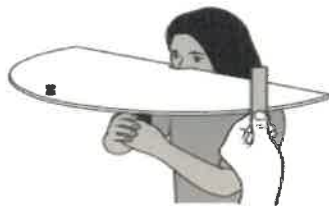
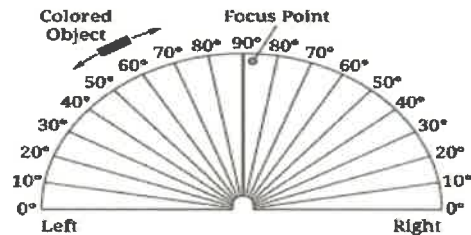
on color vision and identification of movement

Back up your claim with evidence from our study

Use your evidence above. Further support your evidence with a concept from our content on sensation and vision:

Multiple Choice Practice:

- Answer this question by yourself to start. Make sure to note the order in which you eliminated choices and why.
- When everyone in your group is done share out your process and compare
- Be prepared to share with the whole class



Degree First Observed Movement	Degree First Observed Color
23 degrees	51 degrees

Researchers were interested in whether the rods or the cones in the retina were more sensitive to detecting the movement and the color of objects in the environment. Research participants were asked to stare at a focus point while the researcher, starting at 0°, moved a red-colored object slowly around the edge of the arc apparatus. The degree of the angle when the participants first observed movement and color were documented. The mean degrees for each are presented in the table. Which of the following conclusions is best supported by this data?

Researchers were interested in whether the rods or the cones in the retina were more sensitive to detecting the movement and the color of objects in the environment. Research participants were asked to stare at a focus point while the researcher, starting at 0°, moved a red-colored object slowly around the edge of the arc apparatus. The degree of the angle when the participants first observed movement and color were documented. The mean degrees for each are presented in the table. Which of the following conclusions is best supported by this data?

- (A)** The average angle the participant first notices movement will be larger than the average angle for first noticing the color.
- (B)** The average angle the participant first notices the color will be larger than the average angle for first noticing movement.
- (C)** The average angle the participant first notices the color will be the same as the average angle for first noticing movement.
- (D)** There is not enough evidence to predict how each person will perceive based on the photoreceptors of the retina.

State your order of elimination and rate your confidence in your answer choice:

Citations:

- APA National Standards For High School Psychology:
<https://www.apa.org/education-career/k12/national-standards>
- AP Psychology Course Exam Description:
<https://apcentral.collegeboard.org/media/pdf/ap-psychology-course-and-exam-description.pdf>
- Metronome Activity: source unknown
 - Note: This may be my original work but I also may have adapted it from someone or some other source
- Just Noticeable Difference- source unknown
 - Note: This may be my original work but I also may have adapted it from someone or some other source
- Sensory interaction- source unknown
- Balance- unknown
 - Note: This may be my original work but I also may have adapted it from someone or some other source
- Mcgurk- brain games:
https://www.google.com/search?sca_esv=0baf5c9e671f57b4&rlz=1CACRSK_enUS1048US1048&q=brain+games+mcgurk+effect&udm=7&fbs=AEQNm0Aa4sjWe7Rqy32pFwRj0UkWwAFG7ranuZ26H8IR7pf_8JVvecp-LzvobrsWeGPHXQ9gKB1p303lqjihhRWlIj0eJgLLo4lLf6nrDCbQ0vFzvC66uGSilMFtbURDIL3e5j3BPkIIB_aa4LX2n3vzixkxO8BpXnG4hhuTw2fPb1TipiyBGN5hJSGeQXpHb0aTNJlzeKaN2wz91kU1MCnSnJgJYuCCYg&s

a=X&ved=2ahUKEwiFoa7OvpuKAxU1mokEHco-G2lQtKgLegQlExAB&biw=1536&bih=743&dpr=1.25&safe=active&ssui=on#

- Mirror - This is my original activity. It was developed after listening to a physical therapist describe its use for nerve pain in patients with phantom limb. It was also a way for me to simulate aspects of the rubber hand illusion without the use of a hammer with high school students
- Sensory Interaction EBQ- This is my original idea. It is based on the concept of an Evidence Based Question in AP Psychology. Since this is early in the year students are working with class activities instead of full research article sources to slowly introduce these skills
- Color and Movement Protractor Study: This is my activity but was created in conjunction with two elements. I used a question in AP Classroom from the college board to further develop it into a full study and demonstration that my students can complete. Maria Vita has a previous written analysis of this study but after conferring with her she had not had students complete the activity personally.
- Color and Movement AAQ/EBQ practice: This was created by me to focus on writing and data skills related to science practices and writing in AP Psychology. It is based off of the structure of an AAQ and EBQ
- Multiple Choice Question: This comes from AP Classroom