


# Unit 4 - Sensation + Perception Intro.

1/31/2019

**UNIT IV**  
**LEARNING TARGETS**

**Sensation and Perception**



16-1 Describe sensation and perception, and explain the difference between bottom-up processing and top-down processing.  
 16-2 Discuss how selective attention directs our perceptions.  
 16-3 Describe the three steps that are basic to all our sensory systems.  
 16-4 Discuss the difference between absolute thresholds and difference thresholds.  
 16-5 Discuss how we are affected by subliminal stimuli.  
 16-6 Explain the function of sensory adaptation.

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**Module 16**

**Basic Concepts of Sensation and Perception**

**What are sensation and perception?**


<b>sensation</b>	The process by which our sensory receptors and nervous system receive and represent stimulus energies from our environment.
<b>perception</b>	The process of organizing and interpreting sensory information, enabling us to recognize meaningful objects and events.

**So what does that actually mean?**

<b>sensation</b>	Your nose, eyes or other sensory organs bring in information... a smell... a color... a tall, blond boy with freckles...
<b>perception</b>	Your brain makes sense of that information... oh... that is my granddad's rhubarb pie, that turquoise shirt is stunning, hey... is that my brother?

**TRY IT**

Does this image represent sensation or perception?



How do you know?

**TRY IT**

For each of the senses below, provide an example of how sensing differs from perceiving.


vision
audition (hearing)
gustation (tasting)
touch, temperature and pain

**How does processing of stimuli work?**

<b>bottom-up processing</b>	Starting with the sensory input, the brain attempts to understand/makesense. You see a long, slim, slithering creature on the ground... you process... ah! A snake!
<b>top-down processing</b>	Guided by experience and higher-level processes, we see what we expect to see. An experienced hiker you expect to see snakes on your hike so windy stick, lizards, etc. all seem like snakes.


**TRY IT**

In the image below, what can we detect through bottom-up processing? Top down processing?



**TRY IT**

Did you see it?



Our sensory and perceptual processes work together to help us sort out complex images, including the hidden couple in Sandro DePretis's drawing, *The Flowering of Love*.

**1. What Would You Answer?**

**What occurs when experiences influence our interpretation of data?**

- A. selective attention
- B. transduction
- C. bottom-up processing
- D. top-down processing
- E. signal detection theory


**What is selective attention?**

- Our tendency to focus on just a particular stimulus among the many that are being received.
- Although we are surrounded by sights and sounds, smells and tastes, we tend to pay attention to only a few at a time.

**Has this happened to you?**

- You are at a crowded party with lots of your friends and everyone is talking so it is LOUD!
- You are focusing your attention on the conversation with your friend nearby.
- Then someone on the other side of the room says YOUR name... and you HEAR it!
- This is called the cocktail party effect—you focused your attention on one particular voice (that person called your name) and the crazy loudness of all those other voices.
- The cocktail party effect is a great example of selective attention.

**Do you text or talk on your cell phone while driving your car?**



**Selective attention and accidents**

**Let's consider the research on selective attention...**

fMRI scans show a 37% decrease in brain activity in areas vital to driving when a driver is listening to a conversation. (Just et al., 2008)

University of Sydney researchers found that cell phone users were four times more at risk of a car crash. (McEvoy et al., 2005, 2007)

The National Safety Council found that 28% of traffic accidents occur when drivers are chatting on cell phones or texting. (NSC, 2010)

**It is not about the cell phone... it's about distracting your attention!**

Using a cellphone (even a handsfree set) carries a risk 4 times higher than normal—equal to the risk of drunk driving.


(McEvoy et al., 2005, 2007)

**What is selective inattention?**

At the level of conscious awareness, we are in only one place at a time and so we missalient objects that are available to be sensed.

**Inattention blindness:**

failing to see visible objects when our attention or focus is directed elsewhere




Viewers of this basketball drill are asked to count the number of passes between white-shirted players.

An umbrella toting woman saunters across the screen. (Weisser, 1979)

Only 21% reported the presence of the woman. (Weisser, 1979)

**Change blindness:**

failing to notice changes in the visual environment



While a white-haired man provides directions to a construction worker...

two researchers rudely pass between them interrupting his vision...

the original worker switches places with another person. 67% failed to notice the change.

**What are the three steps involved in sensation and what is transduction?**

**Transduction:**  
conversion of one form of energy, such as light waves, into another form, like neural impulses that our brain can interpret

**STEP ONE**  
receive

**STEP TWO**  
transform

**STEP THREE**  
deliver

**2. What Would You Answer?**

As Jeff reads his psychology textbook, he is able to convert the light waves into signals that his brain can interpret due to the concept of

A. transduction.  
B. perception.  
C. priming.  
D. signal detection theory  
E. threshold.

**What is psychophysics?**

For instance...  
...what is it about the smell, taste, and texture of buttery popcorn that produces a delicious, satisfied, happy response in you?


The study of relationships between the physical characteristics of stimuli, such as their intensity and our psychological experience of them.

**What is the difference between absolute threshold and difference threshold?**

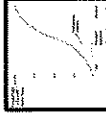
**absolute threshold**  
The minimum stimulation needed to detect a particular stimulus 50 percent of the time.

**difference threshold**  
The minimum difference between two stimuli required for detection 50 percent of the time. This is termed the just noticeable difference or JND.

**How do we test for absolute threshold in a sense like audition?**



A hearing specialist exposes both of your ears to varying sound levels.



For each tone the test defines the pitch at which you can detect the tone 50% of the time.

**Why are some people better at detecting signals than others?**

- Have you ever been caught texting on your phone during class by a teacher in one class but can get away with it regularly in another class?
- Did you know that even when parents of a newborn are exhausted from sleep deprivation, they can still hear the slightest whimper from their baby even though the loud sounds of the trash truck or screeching car on the street outside may go completely unnoticed?
- Do you or your friends have different opinions about how much onion is too much onion on a burger?

**What is the signal detection theory?**

A theory predicting how and when we detect the presence of a faint stimulus amid background stimulation

Depends on two conditions:  
the strength of the signal (how loud the sound is, how bright the light, how heavy the touch...)  
our psychological state (our expectations, our motivation, and how alert we are)

**So you can see the light...but how can you tell when it gets brighter?**

Have you ever been in a crowd of families, like at a waterpark or amusement park, and yelled "Dad!" to get your father's attention? How does YOUR Dad know to turn around?

How does a musician know when they are playing a little flat or sharp of their intended note?

How can you tell when just the slightest note of imitation is in your friend's voice?

**What is Weber's Law?**

To be able to tell the difference between degrees of stimulation, two stimuli must differ by a constant minimum percentage.

How will I notice the difference?

- Two lights must differ in intensity by 8% for you to notice the change.
- Two objects must differ in weight by 2%.
- Two tones must differ in frequency by 3%.

**How does Weber's Law help explain the just noticeable difference (jnd) ?**

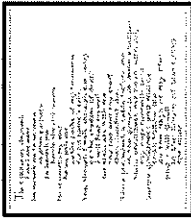
The difference threshold is the minimum difference between two stimuli required for detection 50 percent of the time.

We experience the difference threshold as a just noticeable difference (jnd).

Weber's law tells us that the difference must vary by a constant percentage (as shown on the last slide), not a constant amount.

**TRY IT**

How many lines are required for you to experience a just noticeable difference (jnd)?



**3. What Would You Answer?**

What principle states that to be perceived as different, two stimuli must differ by a minimum percentage rather than a constant amount?

A. absolute threshold.  
 B. difference threshold.  
 C. signal detection theory  
 D. priming.  
 E. Weber's law

**What are subliminal stimuli and how are we affected by them?**

Subliminal stimuli are not detectable 50% of the time. They are below your absolute threshold.

You may not notice subliminal stimuli at all if they are weak.

**What is priming?**

Priming is the activation, often unconsciously of certain associations, thus predisposing one's perception, memory or response.

Even if YOU don't think YOU notice a stimulus your brain might, and that can impact you.

**What is sensory adaptation?**

Sensory adaptation is diminished sensitivity to stimuli as a consequence of constant stimulation.

Evolutionary psychologists suggest that once we notice and evaluate a new stimulus non-threatening, we can pay less attention to it.

This saves our attention for new incoming stimuli, or changes in the existing stimuli. This could be adaptive for survival.

**TRY IT**

**Stop and talk. Has this happened to you?**

Ever notice how your friend's home has a certain... smell? And have you noticed that it "goes away" after you have been there a few minutes? Why?

Do you ever look all around for your cell phone only to realize it is in your pocket?

Has a family member fallen asleep in front of the TV and to be kind, you turn off the TV and cover them with a blanket? Do they wake up? Why?

**So why does sensory adaptation occur?**

- Being able to ignore unthreatening/unchanging stimuli leaves us free to focus on the stimuli that IS changing.
- Our sense receptors are alert to novelty... a new situation means we need to evaluate and assess it and check for danger.
  - So it is functional... adaptive.
- We perceive the world not exactly as it is, but as it is useful for us to perceive it.

**4. What Would You Answer?**

Tyshane went swimming with friends who did not want to get into the pool because the water felt cold. Tyshane jumped in, and after a few minutes declared, "It was cold when I first got in, but now my body is used to it." Come on in! Tyshane's body became accustomed to the water due to

A. priming.  
 B. the absolute threshold.  
 C. the difference threshold.  
 D. selective attention.  
 E. sensory adaptation.

**Learning Target 16-1 Review**

Describe *sensation* and *perception*, and explain the difference between *bottom-up processing* and *top-down processing*.

- *Sensation* is receiving signals from our *sensory receptors*.
- *Perception* is processing and interpreting those signals.
- *Bottom-up* processing begins at the sensory level.
- *Top-down* processing is guided by higher-level perceptions and expectations.

**Learning Target 16-2 Review**

Discuss how selective attention directs our perceptions.

- We *selectively attend*, and process, a very limited portion of incoming information, blocking out much and *offenshifting* the spotlight of our attention from one thing to another.
- Focused intently on one task, we often display *inattention blindness* (including *change blindness*) to other events and changes around us.

**Learning Target 16-3 Review**

Describe the three steps that are basic to all our sensory systems.

Our senses (1) receive sensory stimulation (2) transform that stimulation into neural impulses, and (3) deliver the neural information to the brain.

- *Transduction* is the process of converting one form of energy into another.
- Researchers in *psychophysics* study the relationships between stimuli, physical characteristics, and our psychological experience of them.

**Learning Target 16-4 Review**

Discuss the difference between *absolute thresholds* and *difference thresholds*.

- *absolute threshold*: minimum stimulation necessary to be consciously aware of it 50% of the time.
- *signal detection theory*: perception depends on 1) signal strength and 2) experience and expectations
- *difference threshold* (just noticeable difference or *JND*): minimum stimulus difference we can discern 50% of the time.
- *Weber's law* states that two stimuli must differ by a constant percentage to be perceived as different.

**Learning Target 16-5 Review**

Discuss how we are affected by subliminal stimuli.

- *Priming* shows that we can be affected by stimuli so weak that we don't consciously notice them, and we can evaluate a stimulus even when we're not consciously aware of it.
- We can be primed by *subliminal* stimuli, but research indicates that such stimuli cannot persuade us or change our behavior.

**Learning Target 16-6 Review**

Explain the function of sensory adaptation.

*Sensory adaptation* (our diminished sensitivity to constant odors, sights, sounds, and touches) focuses our attention on information that changes in our environment.