

General Psychology 201

Sensation and Perception

Basic principles of sensation

Sensory thresholds and sensory adaptation

Science versus pseudoscience 3.1: subliminal perception

Vision

What we see

How we see (cornea, pupil, iris, lens)

- The retina (rods and cones), the blind spot

Science versus Pseudoscience 3.2: Iridology

Processing visual information

Color vision (The experience of color, How we see color (the trichromatic theory and opponent-process theory))

Hearing

What we hear / how we hear (place theory and frequency theory)

The chemical sense and body senses

How we smell

- Science versus pseudoscience: pheromones

Taste

The skin and body senses

Perception

Bottom-up and top-down processing

The perception of shape

Depth perception (monocular cues and binocular cues)

The perception of motion

Perceptual constancies

Critical Thinking 3.4: ESP

Perceptual illusions

The effects of experience on perceptual interpretations

Culture and the Müllen-Lyer illusion

Application: Strategies to control pain

What are some phenomena this chapter can help explain?

Taste: Why does orange juice taste bitter right after you brush your teeth?

Vision: Why do you see afterimages? Why are some people color deficient (commonly called color blind)? What is the blind spot, why does it occur, why don't we notice it? How do we perceive depth (both with one eye and two eyes)?

Vestibular sense: How does this help explain airplane crashes like JFK Jr. (what are pilots trained to do)?

There is very little evidence to support the claim that people possess ESP abilities such as telepathy, clairvoyance, psychokinesis and precognition, but about of American adults believe in ESP. What is one of the many reasons why people believe in ESP?
How do labels affect perception?

What is the difference between sensation and perception?

Sensation: The process of detecting a stimulus, such as

- light waves (vision),
- sound waves (hearing),
- chemical molecules (smell and taste),
- heat or pressure (touch).

Perception: The process of integrating, organizing and interpreting sensations.

You might want to think of sensation and perception as two ends of a continuum. There is no clear dividing line between sensation and perception. Where sensation ends and perception begins is difficult to determine.

The Basic Senses and What They Detect

Energy senses

Vision (electromagnetic energy—light waves)
Hearing (sound waves)

Chemical senses

Smell (airborne chemical molecules)
Taste (dissolvable chemical molecules)

The skin and body senses

pressure/touch
temperature
pain

Movement
Position (kinesthetic)
Balance (vestibular)

There are some basic concepts that psychologists use when talking about the sensitivity of the senses (page 90).

Absolute threshold: The smallest detectable strength of a stimuli that can be detected half the time, or 50% of the time. This label seems counterintuitive, but it is not. Why?

Difference threshold: The smallest possible difference between two stimuli that can be detected half the time. This is also called just noticeable difference (jnd).

Weber's law: A principle of sensation that holds the size of the just noticeable difference (jnd) will vary depending on its relation to the strength of the original stimulus.

Sensory adaptation: The decline in sensitivity to a constant stimulus.

How Sensitive are the Senses?

The absolute threshold is the smallest possible strength that can be detected half the time.

Light	A candle flame seen 30 miles on a clear, dark night.
Sound	The tick of a watch under quiet conditions at 20 feet.
Taste	One teaspoon of sugar in 2 gallons of water.
Scent	One drop of perfume diffused into the entire volume of a 3-room apartment.
Touch	The wing of a bee falling on your cheek from a height of 1 centimeter (about 2/5 of an inch).

How do psychologists determine whether a person
(a) detecting a signal (sight, sound, taste, etc.), or
(b) guessing

Why is the absolute threshold defined at when a person can detect a stimuli 50% of the time, not 0% or 100%?

Why is an Absolute Threshold defined at 50%, not 0%

A psychologist will present a person with a spot of light or not present a person with a spot of light.

Are you ready?	The psychologist presents a signal or not (eg. spot of light)	Was there a spot of light?	Response	Outcome
	Present <i>Absent</i>	 	Yes	Correct (hit)
			No	Wrong (miss)
			Yes	Wrong (false +)
			No	Correct

Trial	stimulus	Is there a dot present?	Answer	Outcome
1	.		Yes	correct
2			No	correct
3			Yes	Wrong (false +)
4			No	correct
5	.		No	Wrong (miss)
6			No	correct
7	.		Yes	correct
8	.		No	Wrong (miss)

9			yes	Wrong (false +)
10	.			

This testing process is referred to as signal detection theory.

Why do psychologists use this definition of absolute threshold instead of when people cannot detect a light source, scent, sound, etc.?

If one guesses whether or not a signal is present or not, they are likely to be correct 50% of the time. When the accuracy rate drops down to 50%, the psychologist cannot tell the difference between whether or not you are guessing or are able to detect a stimulus.

If the detector is doing better than chance, is it statistically significant?

How can we use the basic idea of Signal Detection Theory to something other than identifying the absolute thresholds of the human sense?

How about determining the accuracy of lie detectors?

How about determining the accuracy of an anthrax detector?

How about determining the accuracy of any detector?

Are you ready?	The person tells a truth or tells a lie		Response by detector	Outcome
			Lie	Correct (hit)
			Truth	Wrong (miss)
			Lie	Wrong (false +)
			Truth	Correct

What kinds of errors occur if the lie detector is not very accurate (which they aren't very accurate)?

What kind of errors occur if the event is uncommon (eg. most people tell the truth, and lying is uncommon)?

What would the results be if the detector was a fake (always says nothing is there, for something that is rarely present)?

How can we use the basic idea of Signal Detection Theory to something other than identifying the absolute thresholds of the human sense?

How about determining the accuracy of lie detectors?

How about determining the accuracy of an anthrax detector?

How about determining the accuracy of any detector?

Are you ready?	The person tells a truth or tells a lie		Response by detector	Outcome
	Lies		Lie	Correct (hit)
			Truth	Wrong (miss)
	Truth		Lie	Wrong (false +)
			Truth	Correct

5% of the population are liars, 50 liars, 950 truth tellers.

With 70% accurate, the numbers go 35, 15, 285, 665

Why should you care?

Are you ready?	Anthrax spores are present or absent		Response by anthrax test	Outcome
	Present		Anthrax	Correct (hit)
			None	Wrong (miss)
	Absent		Anthrax	Wrong (false +)
			None	Correct

Trial	Stimulus (Anthrax)	Is Anthrax present?	Answer	Outcome
1			No	correct
2			No	correct
3			No	correct
4			No	correct
5			No	correct
6			No	correct
7			No	correct
8			No	correct
9			No	correct
10			No	correct

Science versus Pseudoscience 3.2, p 96: Iridology

Claim: Examining the color and markings of the iris with a magnifying glass can reveal information about you such as the following:

- mental stress
- personality characteristics
- genetic tendencies
- nutritional deficiency
- past diseases and injuries

Iridologist use highly detailed charts to “diagnose” such characteristics (see the chart on page 96). This is a pseudoscience because it makes a claim that is not supported by the evidence.

Scientific claims have the following characteristics:

Must be testable and falsifiable

The proof is on the positive: support for a claim must be provided by support for that claim, not that skeptics cannot provide it wrong (this is similar to the logical fallacy of appeal to ignorance).

Extraordinary claims must be followed by extraordinary evidence.

Questions one should ask:

Are their claims testable (does it work)?

What is the evidence?

What is the quality of the evidence?

- Why does it work? (is it due to perception, beliefs or real effect)

What were some of the tests of Iridology?

In one test, iridologists were given two photographs of the same iris. They were told that one photograph was taken before and one after the diagnosis of an acute disease. Iridologists were to state if there was a change in the iris and which organ was affected.

If iridology is a valid assessment technique, what should be the outcome of the test?

What was the outcome?

In another test, three iridologists and three ophthalmologists (physicians with specialized training in diseases of the eye) were asked to judge photographs the eyes of 143 people. Of these people, 48 people had kidney disease, which is very easy to detect by iridologists. Keep in mind ophthalmologists diagnose diseases of the eye using other methods. If the claim is true, what should the outcome of the test reveal if iridology works?

If iridology is a valid assessment technique, how should the performance of the iridologist compared with the ophthalmologists?

If iridology is a valid assessment technique, how should the performance of the iridologist compared with chance / guessing?

What was the outcome?

Subliminal messages
(Science versus Pseudoscience 3.1, page 93)

Claim: Subliminal messages (messages that are present, but we are not consciously aware of), affect behavior.

Background: In 1957, James Vicary (a marketing executive) claimed to have increased popcorn sales and Coca-cola by flashing the words “Eat popcorn” and “Drink Coke” during the movie.

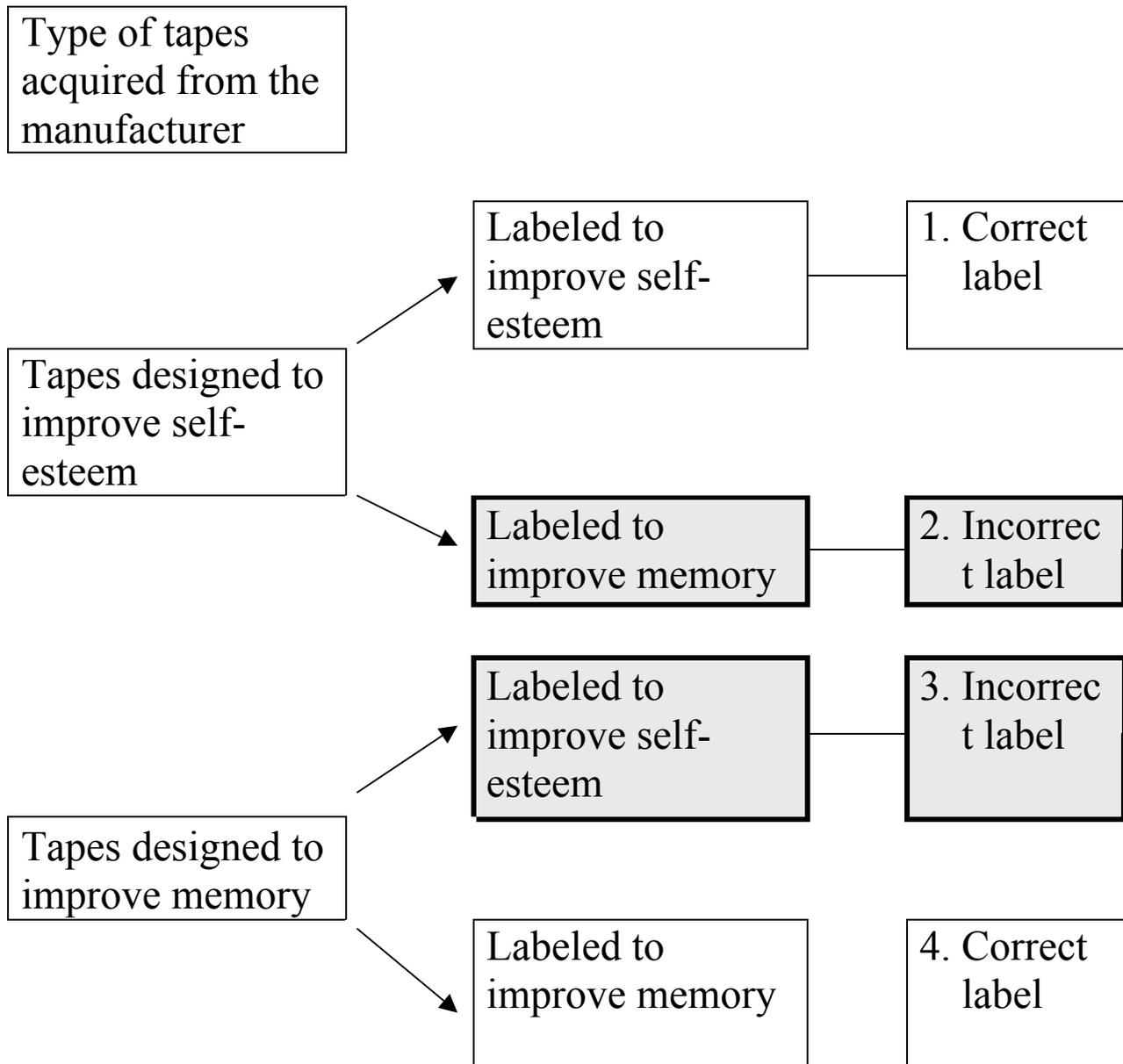
The public response? Governments might use this technique to “brainwash” its citizens.

Related topics to subliminal messages:

Subliminal messages: Embedded in soothing music or nature sounds are subliminal messages (messages that are present but we are not consciously aware of), marketed to help your memory, conquer fears, relieve pain, attract men/women, lose weight, stop smoking...

Some people claim that there are backward messages in records/song lyrics and “hidden pictures” in advertising.

- (1) If there are subliminal messages are effective, how would you test it scientifically?
- (2) What are some problems that you need to consider in your design?



Four different groups of people were randomly assigned to these four conditions and listened to the tapes for 4 weeks (as recommended by the manufacturer).

Memory ability and
Self-Esteem was
measured

Listened to a
correctly labeled
S.E. tape

Memory ability and
Self-Esteem was
measured
AND
was asked if their
S.E. and memory
improved

Memory ability and
Self-Esteem was
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Listened to an
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For each individual, the following were assessed:

Their memory abilities before listening to the tape.

Their memory abilities after listening to the tape.

Their self-esteem before listening to the tape.

Their self-esteem after listening to the tape.

Their perception of whether or not their memory improved after listening to the tapes.

Their perception of whether or not their self-esteem improved after listening to the tapes.

What are the independent variable(s)? (2-label and tape)

What are the dependent variable(s)? (3-SE, memory and perception)

Potential Outcomes:

If the tapes are effective in changing behavior, then the tapes (regardless of how they were labeled) should change their behavior.

If the tapes are ineffective in changing behavior, there should be no difference among the groups.

What has been found:

People think that subliminal messages are effective, but actual effectiveness is non-existent. For example, people believe their memory has improved, but it actually has not. Subliminal messages can have an effect that range from seconds to minutes after presentation. This effect can influence the likeability of a neutral item. This influence is limited to simple stimuli or phrases.

Why do people believe in subliminal messages?

What factors do psychologists know that influences people's behavior?