

Psychology: From Inquiry to Understanding 2/e

Scott O. Lilienfeld
Steven Jay Lynn
Laura Namy
Nancy J. Woolf



Prepared by Caleb W. Lack

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Chapter Four

Sensation and Perception: How We Sense & Conceptualize the World

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Lecture Preview

- **Sensation and perception**
- The visual system
- The auditory system
- The sensual sense
- Our body senses

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Two Sides of the Coin

- **Sensation** is the detection of physical energy by our sense organs, which send that information to the brain
- **Perception** is the brain's interpretation of raw sensory data
- When the way we perceive a stimulus does not match reality, that's an **illusion**

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Is this an illusion? Why?



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Figure 4.1 Separating Sensation from Perception. Hold this page about 10 inches from your face. Close your right eye and keep focusing on the white circle. Can you see the white X? Now slowly move the page toward your face and then away from it: at some point the white X will disappear and then reappear. Surprisingly, your brain supplies an illusory background pattern that fills in the white space occupied by the X. (Source: Glynn, 1999)



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Sensation

- How do signals that make contact with our sense organs become translated to information?
- **Transduction**—process by which the nervous system converts an external energy or a substance into excitation or inhibition of neurons in the brain.
- **Sense receptor**—specialized cell that transduces a specific stimulus
 - Give me sense receptors examples.

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Sensation

- The external stimulus is converted by a **sense receptor** into neural activity via **transduction**
- Despite their differences, all our senses rely on a handful of principles
- Activation is highest when stimulus is first detected, then **sensory adaptation** occurs
 - Give me an example of sensory adaptation?

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Psychophysics

- Study of how we perceive sensory stimuli based on their physical characteristics
- Study of the relation between physical characteristics of a sense signal and its perception

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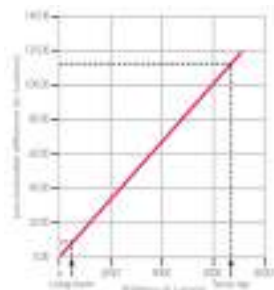
Some Psychophysics Terminology

- **Absolute threshold** is the lowest level of a stimulus we can detect 50% of the time
 - A single candle 30 miles away
 - 50 odorant molecules
- The **just noticeable difference** is the smallest amount of stimulus change we can detect

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Weber’s Law

- Follow **Weber’s law**—the stronger the stimulus, the greater change needed to detect



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Signal Detection Theory

- Theory regarding how stimuli are detected under different conditions
- Just learn the basic terminology

	RESPOND "YES"	RESPOND "NO"
Stimulus present	True Positive	False Negative
Stimulus absent	False Positive	True Negative

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When Senses Meet the Brain

- After being transduced, our brains then organize the sensory data into meaningful concepts
- **Perception** is the brain's interpretation of raw sensory data
- Our brains piece together
 - A) What's in our sensory field
 - B) What was there a moment ago
 - C) What we remember from our past

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The Multitasking Brain

- **Bottom-up vs. top-down processing**
- **Bottom-up:** Building whole stimulus from its parts. From sense to perception.
- **Top-down:** building perception based on beliefs and expectations. From knowledge to perception.

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Bottom-up vs. top-down processing

- I will show you a woman picture. Who is this woman?



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Perceptual Hypotheses

- **Perception** is the brain's interpretation of raw sensory data
- Our brains piece together
 - A) What's in our sensory field
 - B) What was there a moment ago
 - C) What we remember from our past
 - «experience shapes our perceptual hypotheses»
 - «we perceive with reference to our hypotheses»

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Perceptual Hypotheses

- **Perceptual sets** occur when our expectations influence our perceptions

H or A?



Old or young?

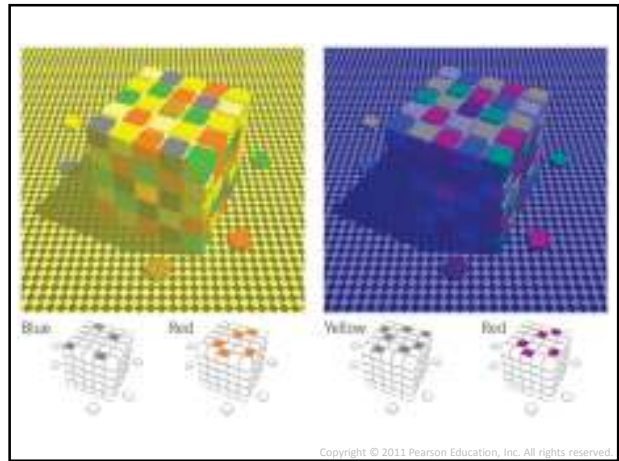
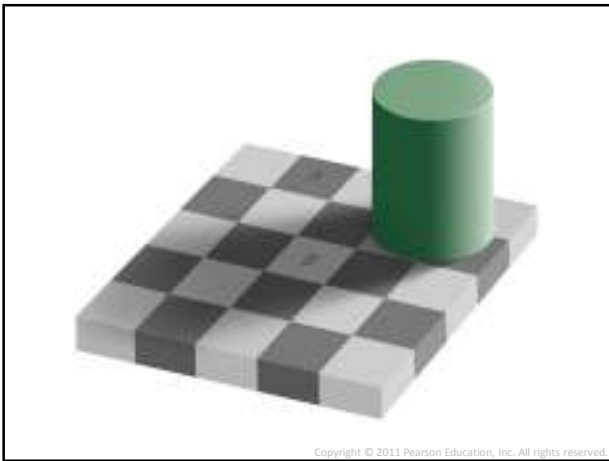


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Perceptual Hypotheses

- **Perceptual constancy** allows us to perceive stimuli consistency across conditions
- We don't see the size, shape, or color of an object changing despite the objective fact that they do
- Size, shape, color constancy

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The Role of Attention

- **Selective attention** allows us to choose which sensory inputs to focus on and which to “turn down”

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Processing Only One Channel at Once

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This image shows a control room with many computer monitors. Only one monitor in the foreground is clearly visible, while the others are blurred, illustrating the concept of processing only one channel at once.

The Role of Attention

- **Selective attention** allows us to choose which sensory inputs to focus on and which to “turn down”
- The other “channels” are still being processed at some level, though
 - Cocktail party effect

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Figure 4.10 The Cocktail Party Effect. The cocktail party effect helps explain how we can become aware of stimuli outside of our immediate attention when it's relevant to us—like our names.



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Blinding Problem

- One of the great mysteries of psychology is just *how* our brains combine all the various stimuli around us into a coherent whole
- The look, feel, smell, and taste of an apple all rely on different areas of the brain to process, but, we just see an apple!

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Subliminal Information Processing

- We process many sensory inputs unconsciously and many of our actions occurs with little to no forethought or deliberation
 - We walk, speak, type, drive without thinking about it.
- If we can detect stimuli without knowing it, does that change our behavior?

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Subliminal Perception

- The processing of sensory information that occurs below the level of conscious awareness
- Researchers present a word/picture very quickly (50ms)
- Subjects cannot perceive the stimulus
- Effects of subliminal stimulus on a task was investigated

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Subliminal Perception

- The processing of sensory information that occurs below the level of conscious awareness
- Can have a brief, short-term impact on behaviors and attitudes
- Effect disappears when subjects are aware of or suspect subliminal influences

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Subliminal Persuasion

- Does subthreshold stimuli influence your vote decisions, product choices, life styles?
- Subliminal word “cola” does not influence beverage choice.
- Fairly unlikely to produce large-scale or enduring attitudes or decisional changes

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Extrasensory Perception

- The perception of events outside the known channels of sensation
 - Proponents of ESP argue that we can perceive events outside of the known channels of sensation, like seeing, hearing, and touch.
- What is the difference between subliminal and extrasensory perception?

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Extrasensory Perception

- Parapsychologists, investigators who study ESP, have divided ESP into three major types:
 - Precognition—predicting events before they occur.
 - Telepathy—reading other people’s minds.
 - Clairvoyance—detecting persons or objects that are hidden from view.
- There is no scientific evidence in favor of ESP

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Why People Believe

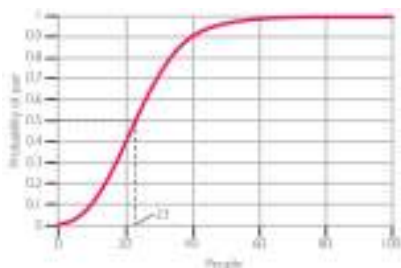
- 40% of Americans adults believe in ESP.
- 2/3 of Americans say they’ve had a psychic experience.
- How many of you believe in ESP?
- Why people believe ESP?
 - Illusory correlations
 - Not understanding chance occurrences

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Why People Believe

- How many of you share a birthday?
- How many people must be in a room before there is a 50% chance that two will share a birthday?

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