


**PSYCHOLOGY**  
(8th Edition, in Modules)  
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PowerPoint Slides  
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**Introduction to  
Sensation and  
Perception**

Module 12

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**Sensation**

**Sensing the World: Some  
Basic Principles**

- Threshold
- Sensory Adaptation

**Selective Attention**

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## Sensation & Perception

How do we construct our representations of the external world?

To represent the world, we must detect physical energy (stimulus) from the environment and convert it into neural signals, a process called **sensation**.

When we select, organize, and interpret our sensations, the process is called **perception**.

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**OBJECTIVE 12-1| Contrast sensation and perception, and explain the difference between bottom-up and top-down processing.**

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## Bottom-up Processing

Analysis of the stimulus begins with the sense receptors and works up to the level of the brain and mind.



Letter "A" is sensed as a black blotch decomposed into features by the brain and perceived as an "A" by our mind .

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## Top-Down Processing

Information processing guided by higher-level mental processes as we construct perceptions drawing on our experience and expectations.

# THE CAT

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## Making Sense of Complexity

Our sensory and perceptual processes work together to help us sort out complex images.



*"The Forest Has Eyes," Bev Doolittle*

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## Sensing the World

Senses are nature's gift that suit the organism's needs.

A frog feeds on flying insects; A male silkworm moth is sensitive to female sex-attractant odor; and we as human beings are sensitive to sound frequencies that represent the range of human voice.

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## Exploring the Senses

1. What stimuli cross our threshold for conscious awareness?
2. Could we be influenced by stimuli too weak (subliminal) to be perceived?
3. Why are we unaware of unchanging stimuli, like a band-aid on our skin?

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# Psychophysics

A study of the relationship between physical characteristics of stimuli and our psychological experience of them.

| Physical World | Psychological World |
|----------------|---------------------|
| Light          | Brightness          |
| Sound          | Volume              |
| Pressure       | Weight              |
| Sugar          | Sweet               |

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## 22<sup>nd</sup> October 1850

Relative increase in mental intensity, [Fechner] realized, might be measured in terms of the relative increase in physical energy required to bring it about (Wozniak, 1999).



Gustav Fechner (1801-1887)

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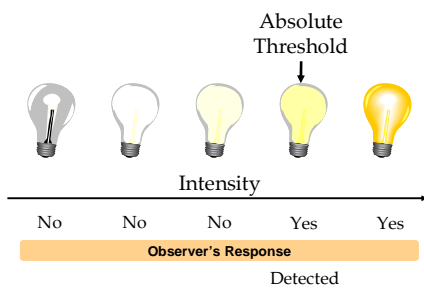
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# Detection



Tell when you (observer) detect the light.

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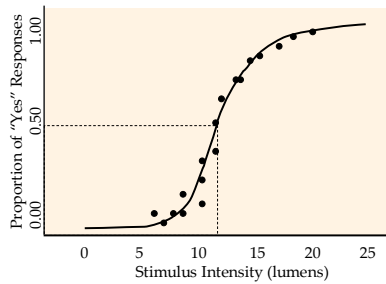
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## Thresholds

**Absolute Threshold:** Minimum stimulation needed to detect a particular stimulus 50% of the time.



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**OBJECTIVE 12-2| Distinguish between absolute and difference thresholds, and discuss whether we can sense stimuli below our absolute thresholds and be influenced by them.**

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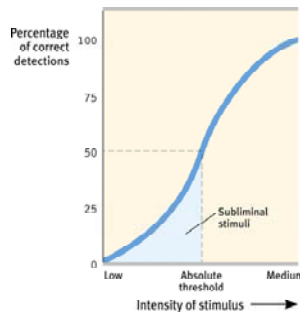
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## Subliminal Threshold

When stimuli are below one's absolute threshold for conscious awareness.



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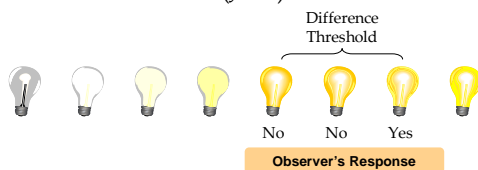
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## Difference Threshold

**Difference Threshold:** Minimum difference between two stimuli required for detection 50% of the time, also called just noticeable difference (JND).



Tell when you (observer) detect a difference in the light.

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## Weber's Law

Two stimuli must differ by a constant minimum percentage (rather than a constant amount), to be perceived as different. Weber fraction:  $k = \delta I/I$ .

| Stimulus | Constant (k) |
|----------|--------------|
| Light    | 8%           |
| Weight   | 2%           |
| Tone     | 3%           |

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## Signal Detection Theory (SDT)

Predicts how and when we detect the presence of a faint stimulus (signal) amid background noise (other stimulation). Assumes that there is no single absolute threshold and detection depends on:

Person's experience  
Expectations  
Motivation  
Level of fatigue



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## SDT Matrix

The observer decides, whether she hears the tone or not, based on the signal being present or not. This translates into four outcomes.

|        |         | Decision    |                   |
|--------|---------|-------------|-------------------|
|        |         | Yes         | No                |
| Signal | Present | Hit         | Miss              |
|        | Absent  | False Alarm | Correct Rejection |

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## Sensory Adaptation

Diminished sensitivity as a consequence of constant stimulation.



Put a band aid on your arm and after a while you don't sense it.

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**OBJECTIVE 12-3| Describe sensory adaptation, and explain how we benefit from being unaware of changing stimuli.**

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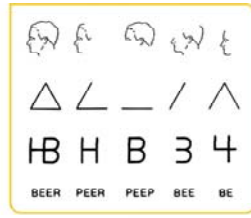
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## Now you see, now you don't



(a)



(b)

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**OBJECTIVE 12-4| Describe the interplay between attention and perception.**

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## Selective Attention

Perceptions about objects change from moment to moment. Different forms of Necker cube become available to our perception, however, one can pay attention only to one aspect of the object.



Necker Cube

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## Inattentional Blindness

Inattentional blindness refers to inability to see a object or a person amidst an engrossing scene. Simmons & Chabris (1999) showed that half of the observers failed to see the gorilla-suited assistant in a ball passing game.



Daniel Simmons, University of Illinois

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## Change Blindness

Change blindness is a form of inattentional blindness, where two-thirds of direction giving individuals failed to notice a change in the individual who was asking for directions.



© 1998 Psychonomic Society Inc. Image provided courtesy of Daniel J. Simmons.

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